

Persistent Teens Pull Off Coup

By Jeffry Beeler
CW Staff

HAYWARD, Calif. — Overcoming almost insurmountable obstacles, two teenagers scored a minor mathematical coup recently when they found the largest known prime number with the help of a mainframe and advisors at California State University here. Eighteen-year-olds Laura Nickel and Kurt Noll uncovered the number, 21,701-1, on Oct. 30 following a tempestuous three-year search that included some 440 hours of computer time on the

school's Control Data Corp. Cyber 174.

With their find, Nickel and Noll eclipsed a record set in 1971 when Dr. Bryant Tuckerman of IBM's Yorktown Heights, N.Y., research center found the largest previously known prime number, 2^{19,937}-1. Tuckerman phoned his congratulations to the pair about three weeks ago after he and mathematician Dr. D.H. Lehmer of the University of California at Berkeley independently confirmed the primality of the Nickel-Noll find.

Throughout their long search for the 6,533-digit number, the two youths bat-

tled parental and administrative objections that frequently overshadowed the intellectual challenges of their enterprise. Nickel's parents particularly opposed the project because it forced their daughter — a Hayward High School dropout who has attended Whittier College in southern California — to spend long periods away from home.

"She was a bit wild," confessed Cal State math lecturer Dan Jurca, who aided the pair by providing research material and arranging for them to use the school's

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COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

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The V-8600 mainframes unveiled by NCR Corp. last week — its largest CPUs yet — feature 64K-bit memory chip technology.

NCR's Biggest CPUs Yet Feature ECL, 64K-Bit Chips

By Howard A. Karten
CW Staff

DAYTON, Ohio — NCR Corp. announced its largest systems ever last week with the introduction of two mainframes featuring emitter-coupled logic (ECL), 64K-bit memory chip technology and gate speeds of 750 picosec.

Apparently aiming to compete with IBM's 3032 and 3033 processors, NCR said it will begin shipping the V-8650 and the V-8670 in the fourth quarter of 1980.

The smaller system, available with memory sizes of 4M, 6M and 8M bytes, gives 10% more throughput than the IBM 3032, according to a spokesman. The larger V-8670, available with 4M, 6M, 8M, 12M or 16M bytes of storage, gives 15% greater performance than the 3033, he said.

However, it is NCR policy to state these figures in terms of power or throughput, and they are not necessarily indicative of the units' speeds, the spokesman pointed out.

NCR claimed several technological

advances for the systems in addition to those of circuitry. These include a high-speed cache memory, bus architecture, multiple virtual machine capabilities and a pipeline design.

(Continued on Page 8)

ACS to Relieve Host CPU Of Some Net Tasks: Bell

By Ronald A. Frank
CW Staff

WASHINGTON, D.C. — Future users of AT&T's Advanced Communications Service (ACS) will find that certain functions now performed in host mainframes will be moved into the network.

This was one of the Bell System responses to a series of questions about ACS that had been posed by the Federal Communications Commission (FCC) in an attempt to get more details about the proposed AT&T network offering [CW, July 24].

Intel Microcode Lets ECPS Run on 370/145

By Don Leavitt
CW Staff

SAN FRANCISCO — Through a substantial reworking of the microcode used on IBM's original 370/145, Intel Corp. has made the Extended Control-Program Support (ECPS) built into OS/VS1 available to users of that CPU, an Intel spokesman said here last week.

With the change, Model 145 users can gain performance improvements of 12% to 15% compared with operations under unenhanced VS1, he said.

The spokesman said a beta test site that runs its system 24 hours a day, seven days a week — "so they really beat it good and hard" — had seen useful problem program time rise from 60% to 72%. Since the shop normally runs at 100% utilization, the boost in user time had to be a reflection of reduced supervisor time, he asserted.

Introduced by IBM when it announced the 370/148, ECPS has been described as a "hardware assist" since it moves part of VS1 into microcode.

At the ECPS announcement, IBM said the facility could not be made

available on the 145 since that CPU did not have enough microcode space or capability, according to Intel.

Currently, however, ECPS is available not only on the 148 but for VS1 users running on the 135-3, the 138 or the 145-3. It may be used if VS1 is running "native" or under the Virtual Machine facility (VM/370), according to an IBM manual.

Intel said it was convinced the support could be adapted to the original 370/145 so it set its engineers to work to determine what ECPS really did and how it could be fit into the space available on the 145.

They succeeded, the spokesman said, and the ECPS facilities can be utilized by any user after a re-gen of the system. The generation parameters have to specify a desire to use ECPS and, at Initial Microcode Program Load (IMPL), the Intel microcode is loaded from a magnetic tape.

While the vendor is ready to distribute the microcode generally on the basis of the single beta test site's experience, the Intel spokesman also said the company is looking for more test sites.

He apparently does not see the offering as a long-term solution to the typical user. Instead, he said it would probably be of the most benefit to "folks with a 145 that is just about out of gas." With Intel's ECPS in place, these users can "limp along for another couple of months."

ECPS provides no functional benefit, he acknowledged, adding that it does not, for example, support any peripherals that aren't available under non-ECPS-supported VS1. But it does provide the performance boost it was designed to give, he reiterated.

The microcode will be generally available after the first of the year. It will cost from \$500/mo to \$700/mo, depending on the term of the licensing agreement, the spokesman said from One Embarcadero Center, San Francisco, Calif. 94111.

ACS will allow a "decoupling" of the originating and receiving stations in a message transmission, resulting in in-

A CW Special Report on Data Communications Networks appears after the In Depth section, which follows Page 60.

dependence of terminals and hosts, AT&T said.

"This decoupling reduces the terminal communications support burden experienced by hosts in many user net-

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Police Comb Through Printouts, Find Car That Hit Fellow Officer

By Tim Scannell
CW Staff

BOSTON — Aided by a Registry of Motor Vehicles computer, police here have located the car that struck and seriously injured Metropolitan District Commission (MDC) patrolman Harold MacGilvray in a recent hit-and-run accident. The vehicle's driver is still unidentified.

MDC detectives discovered the damaged aqua blue 1968 Chevrolet sedan after a massive two-day, round-the-clock investigation by more than 300 MDC patrolmen. MDC police officials combed through stacks of printouts containing approximately 16,000 possibilities that matched the description supplied by MacGilvray's partner, an eyewitness at the scene.

Officials narrowed the list to about 6,000 cars by eliminating various color combinations and separated the remaining printouts according to different geographic areas. More than 300 MDC policemen then worked both on- and off-duty to locate and examine every car on the final list.

The vehicle was found in nearby Weymouth and identified by matching the car's dented right-front side with a 4 in.-long piece of chrome left at the accident's scene and some paint flecks taken from MacGilvray's uniform.

'Matter of Seconds'

MacGilvray was hit exactly two weeks ago as he and his partner were questioning another driver in the breakdown lane of Boston's Southeast Expressway. The unidentified driver of the Chevrolet was allegedly traveling in the same lane at about 60 miles per hour and hit MacGilvray when he swerved to avoid the stopped car.

The force of the impact lifted the patrolman out of his shoes and tossed him more than 25 feet into the air, Henry Scully, MacGilvray's partner, explained. Scully witnessed the incident as he stood on the other side of the stopped automobile. "In a matter of seconds [MacGilvray] was in the air and the car gone," he recalled.

Extensive Surgery

The driver of the stopped car chased the speeding automobile and provided the police with a vague description of the car's make and color.

MacGilvray was rushed to the Boston City Hospital for emergency treatment and later transferred to the Boston University Medical Center for extensive surgery.

Doctors toiled for 13 hours reattaching the patrolman's aorta, which had been nearly ripped from his heart, repairing a punctured colon and liver, setting two leg bones and rebuilding the circulatory system in the officer's lower right leg.

Doctors are optimistic about MacGilvray's survival, although his name was still on the hospital's critical list at press time.

Printouts Aid Search

This was the first time the MDC ever performed an investigation of such magnitude, MDC spokesman Frank Muelo said. "We were able to find the car through a lot of legwork and good investigatory techniques," he commented. "But we probably would still be looking door-to-door if we did not have the printouts from the registry."

MDC and other police agencies usually access the Registry of Motor Vehicles Control Data Corp. 3300 system

via a computer located at the Massachusetts State Police headquarters. The registry maintains between 3.5 million and 5.5 million "valid" automobile files which are indexed according to the vehicles' identification and registration numbers, according to Robert Capasso, deputy registrar. However, in the MDC's case there was nothing to go on except the class of the vehicle involved in the accident.

Normally this type of search would first have to be cleared through the registry's Special Investigation Section and then the registrar before being submitted to the computer room staff. "But in this particular case, we stopped the shop and put [the request] right through," Capasso noted.

The registry's entire file was matched against the information supplied by MacGilvray's partner and the motorist who gave chase, producing several thousand suspected cars and ultimately leading to the correct vehicle.

Case Not Closed

The investigation, however, is far from over, Muelo observed. Although the owner of the Chevrolet has been identified and a suspect has confessed to driving the car at least two hours before the incident, the guilty driver is presently still at large. "We're not going to rush into it; we're going through it slow and making sure the process is complete," Muelo said.

"When a brother officer is hurt or something like this happens, everybody pools together," Muelo stressed. "You're fighting the court system; you're fighting a lot of different things as a police officer; you're more or less against the world. So you try to hold each other together."

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Virginia Today Conducting Canvass in Senatorial Race

By Tim Scannell
CW Staff

RICHMOND, VA. — The state Board of Elections here will complete its official statewide canvass of the U.S. Senate election votes today to settle a contest that has been troubled by computer foul-ups and human inaccuracies.

Unofficially, Republican John W. Warner defeated Democrat Andrew P. Miller earlier this month by 5,190 votes in what has been described as the closest general election in recent Virginia history. However, the accuracy of that figure and of the entire 1.2 million vote count was questioned because of the numerous delays and discrepancies which plagued the News Election Service's (NES) computer, used to process the Virginia returns on Nov. 7-8.

The NES computer, located in New York, apparently listed more voting precincts in Virginia than the 1,857 the state actually has. At one point, it failed in the middle of a vote count, according to election officials.

In fact, the NES computer went down intermittently throughout the election night, delaying returns and coverage across the country [CW, Nov. 13].

Richard Eimers, NES executive director, acknowledged that the computer was beset with various problems that night, but said he was unaware of any errors in the results.

In addition, the unofficial figures were clouded by the counting of absentee ballots. Some precincts included those votes with the Election Day results, while others processed and returned them separately, officials said.

Tables Could Turn

Because of the numerous errors and Warner's less than one-third of 1% unofficial victory margin, state election officials have cautioned that Miller could easily emerge as the victor following today's canvass. In last year's gubernatorial election, Gov. John N. Dalton unofficially lost to his opponent by 7,000 votes, but was declared a winner after the election results were officially compiled.

However, an unofficial survey of city and county election results conducted by both the NES and the Associated Press revealed that Warner's margin had actually increased by about 600 votes.

Meanwhile, Miller acknowledged that his rival for the U.S. Senate seat is the race's "apparent" victor and said he believes Warner received "the next higher number of votes." However, "that's no concession," he said.

The election board's official vote total is determined by using two sets of election documents — tally sheets, which are used to record the votes at each of the state's 1,857 precincts, and "abstracts," or the official vote totals compiled by city and county election officials. The state's official canvass is always held on the fourth Monday in November following each election.

Although neither candidate has accused the election board of any irregularities, Miller recently petitioned and received the circuit court's permission to review election documents before today's official canvass.

ACS to Move Tasks From CPU Into Net

(Continued from Page 1)

work configurations today. As a result, the movement of certain communications functions from user host computers into the ACS network is supported," AT&T said.

Although the exact functions will depend on the user's application, the phone company said it could suggest some functions that might be included. The company mentioned polling, device handling, broadcast mode, authorization procedures, format and validation routines, error recovery and journaling.

Since terminal output and host input "need no longer be coupled," it serves no purpose for the host to furnish polling support. Even in inquiry/-response applications, where no time delay is specified, advanced polling of terminals by the network and subsequent polling of the net by the host can generate efficiencies, AT&T wrote.

With ACS hosts and terminals de-

coupled, it is no longer necessary to have the host provide communications management functions for the terminals. Moving this task into the network allows the host to accommodate a much larger range of terminals.

Since current address lists are maintained within network storage, user CPUs need only generate suitable messages. These are then transmitted to the appropriate devices connected to the net, Bell told the FCC.

A sophisticated authorization arrangement enables a user to define private subnetworks within the shared ACS net. This capability "extends opportunities for intercompany networking," Bell said.

In addition, messages entered into the net at different times can be stored and consolidated into larger messages. This feature can obviate the need for format and validation support at the host, it added.

Error recovery is handled within the network because it is undesirable to burden the user's mainframe with this task, Bell said. In addition, the net will provide the ability to keep abbreviated records of transmitted messages at either transmitting or receiving stations. This journal capability has long been a feature of message-switching systems, AT&T added.

Unsuitable for Data Base

Responding to a query on whether ACS could be used as a data base system, AT&T told the commission that the only way for customers to store data on ACS would be in the form of messages or through customized communications programs. ACS is unsuitable for use as a data base system because "the techniques of data base management are absent from the service," AT&T wrote.

The service will not provide the means for developing relationships between items of data contained in different messages or to retrieve items from messages stored within the network. So while the customer's use of

such as wholesale distributors and firms involved with order entry.

The system can also be used for batch and on-line applications through the use of floppy-disk-loaded firmware, the company noted. The firmware is not accessible to users.

In addition to being compatible with 8400 system software, such as NCR's Interactive Resource Executive, the system is said to be compatible with I-8100 and I-8200 software.

No peripherals were announced with the processor. However, NCR said it can accommodate from 81 million to 648 million bytes of disk storage, as well as previously introduced line printers, magnetic tape storage devices and CRTs.

A typical system configuration including 256K bytes of memory, four CRTs, 81 million bytes of disk storage and a 300 line/min printer sells for \$105,130 and rents for \$2,580/mo on a five-year agreement, the company stated.

Potential Costs

On questions related to potential costs for ACS, AT&T said it was working on a Cost of Records System that will allow costs to be allocated to specific ACS rate elements.

While it listed no specific cost data, Bell did describe the four components that will be used to calculate an ACS user's bill. These include a count of packets or bytes transmitted, the number of Network Resource Units (NRUs) utilized, the kilobytes of network storage used as a function of an as yet unspecified unit of time and the elapsed network time used by the customer.

The NRUs will determine the communications management functions within ACS that have been used. Packets will be counted for calls and bytes will be counted for messages to measure the transport facilities that have been utilized, Bell said.

Within the five basic classes of terminal devices ACS will support, AT&T cited more than 500 models listed in various DP reference publications. It is expected that terminals on the list will be ACS-compatible but this is not a certainty, according to Bell. In addition, other terminals not specifically listed may be ACS-compatible, AT&T said.

Applications that particularly lend themselves to ACS usage, according to Bell, include order entry between manufacturer or distributor and supplier; transmission and control of freight shipment documents between shippers, freight carriers and consignees; reservations processing for travel-related organizations; claims processing between medical centers, doctors offices and health insurance companies; and insurance policy and claims processing.

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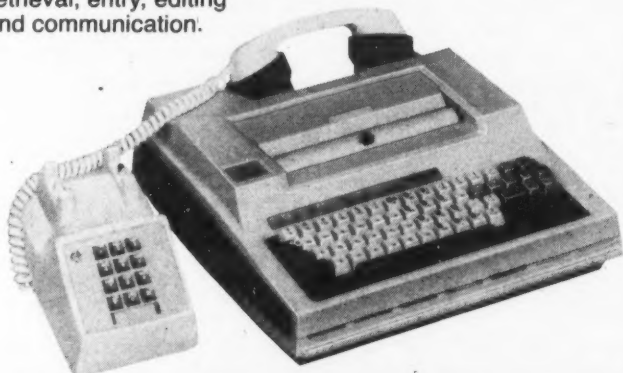
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ACM to Honor Weiss at Confab Next Week

WASHINGTON, D.C. — A series of DP professional awards and a government program featuring speakers from Congress and the executive branch will highlight the annual meeting of the Association for Computing Machinery (ACM) here next week.

The Distinguished Service Award, described as the ACM's chief prize for nontechnical achievement and one in a series of awards for DP excellence, will be presented to Eric A. Weiss of Sun Co.

The Distinguished Service Award will be presented to Weiss on Dec. 4 in recognition of his contribution to ACM and the computing community, particularly in the field of publications and publication policy.

The government program will include speeches by Rep. Jack Brooks (D-Texas), Rep. Charles Rose (D-N.C.) and Paul Bortz, deputy assistant

secretary of the National Telecommunications and Information Administration (NTIA).

Other Recipients

Other award recipients will be Robert W. Floyd, a Stanford University professor, who will receive the A.M. Turing Award for technical accomplishment for his work to improve software, and Raymond Kurzweil, who will receive the Grace Murray Hopper Award for his development of a computer system that reads printed pages aloud to the blind.

As part of the government program, Brooks, the sponsor of the primary piece of legislation affecting government computing, will discuss the Brooks Act and its impact on federal DP over the last 10 years. Rose will describe the growing use of computers by Congress and the resulting oppor-

tunities for increased efficiency in the legislative branch.

Lester Fettig, administrator for federal procurement policy in the Office of Management and Budget (OMB), will describe the challenges facing the government as the single largest consumer of computer products.

Report on Reorganization

The results of President Carter's effort to reorganize federal DP will be presented by Wayne Granquist, also of OMB.

Addressing an area that is anticipated

to have implications for the entire DP field, the NTIA's Bortz will discuss the prospects for a national information policy. Finally, Frank Carr, the commissioner of the General Services Administration (GSA) Automated Data and Telecommunications Service, will describe a number of efforts designed to better manage and coordinate computer and telecommunications policy.

Further information on the conference, which will be held Dec. 4-6 at the Sheraton-Park Hotel, is available from Dennis M. Conti, National Bureau of Standards, Washington, D.C. 20234.

Grand Jury Indicts Rifkin In \$10 Million Theft Scheme

By Tim Scannell
CW Staff

LOS ANGELES — A federal court has indicted Stanley Mark Rifkin on federal charges involving the theft of \$10.2 million from the Security Pacific Bank here last month, and the Federal Bureau of Investigation has arrested a local photographer on charges of hiding the alleged swindler in his apartment.

A federal grand jury charged the computer consultant with four counts of wire fraud, smuggling, interstate transportation of stolen property and entering a bank to commit a felony.

Rifkin was arrested earlier this month and charged with using Fedwire, the Federal Reserve's electronic funds transfer system, to steal several million dollars from the Los Angeles-based bank [CW, Nov. 13]. The funds were transferred via wire to a New York City bank account and subsequently diverted to the Swiss account of Russalmaz, the Soviet

government's official diamond broker. Rifkin allegedly purchased more than \$8 million worth of polished stones which had an estimated retail value of approximately \$13 million on the open market.

Closet Case

Meanwhile, the FBI recently arrested Daniel Wolfson and charged him with harboring and concealing a fugitive after he reportedly tried to prevent agents from arresting Rifkin by hiding the consultant in his closet.

Although more than one newspaper has reported that Rifkin had accomplices during the theft, special agent Roger Young of the FBI's San Diego office said the incident appeared to be a "one-man operation." The transaction with the Soviet firm was a "legitimate deal," Young added, because the company had no way of knowing the money was stolen.

No date has yet been set for Rifkin's trial.

Persistent Teens Compute Largest Prime Number Yet

(Continued from Page 1)

mainframe. "She'd stay out all night and periodically run away from home, and her parents quite rightly objected."

Noll, a Hayward High School senior who is taking an honors calculus course at Cal State, seemed to weather the project with little domestic fuss, Jurca added.

Administrative Opposition

In addition to causing strife at home, the Nickel and Noll undertaking encountered stiff resistance from Cal State administrators, who knew that a hunt for a very large prime number would consume hundreds of hours of expensive computer time.

Opposition to the project proved so great at one point that Jurca doubted the two would ever gain official approval to use the school's computer facilities.

But the youths ignored his dire warnings and persevered with an almost "fanatical" determination, the math lecturer recalled.

Nickel and Noll, who learned the basics of computer programming three years ago at Hayward High School, first became interested in computing very large numbers when they spied a

Cal State math department poster showing a huge quantity that had been calculated by one of the nation's top young scientists.

Determined to duplicate the feat, they sought the advice of Jurca and Math Department Chairman Dr. Arthur Simon and in May 1977 began writing the first of five versions of a machine language program intended to find the world's largest prime number.

With Jurca's help, they finally gained access to the Cal State mainframe and on Oct. 11 began their computer search for the astronomical integer. After 44 tests and less than three weeks of hunting, the pair's persistence was at last rewarded.

Correction

General Telephone Co. has been responsible for engineering the home energy monitoring pilot program at the Top of the World School in Laguna Beach, Calif. [CW, Nov. 13]. "Schoolchildren to Monitor Homes' Energy Use" identified Pacific Telephone Co. as the firm involved. In addition, the students live in Laguna Beach, not in Newport Beach.

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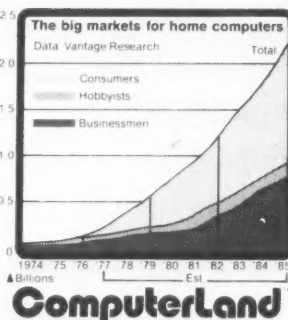
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With Analysis Variance Programs Disciples of Bacchus Automate Wine Rating

By Ann Dooley
CW Staff

DAVIS, Calif. — What's red or white, makes one "tight" and can now be data processed overnight?

Wine, of course — in an automated wine-rating system at the University of California at Davis.

Yes, Bacchus has traded in his wreath of grape leaves for a DP manual. Wine produced by Davis students is now being rated for quality and taste on a mainframe.

Students in the viticulture (grape production) and oenology (wine-making technology) departments here produce the wines by blending ethyl alcohol, polyphenols and several hundred other compounds. Although they still employ the traditional sniff, sip and taste method to judge the wines, the CPU is used to analyze and mathematically rate the blend of the different compounds in each of the wines.

The automated wine rating, which has been at work for nearly eight years, utilizes analysis variance programs on the university's Burrough Corp. B6500 to judge the chemical content of the wines. The time involved in analyzing wine compounds has been cut drastically; wine making is a long, involved process, so this is a real time-saver, according to Walt Winton, department research associate.

The system compares one wine's taste with another or compares wines which have received different treatments in order to determine which is the best quality. Wine can be changed by so many variables, and sometimes the smallest change can create a significant difference in taste and quality, Winton explained.

Different treatments can be conducted in the vineyard or in the winery, all of which affect the wine. Multiple regression techniques have become essential to predict the resulting product with any amount of accuracy.

The automated system allows students to determine what affect each variable has on the finished product and gives them an idea of what is

needed to produce a good wine, Winton said.

In addition to the Burroughs system, a Tektronix, Inc. desktop computer with 32K of memory is used for some of the simpler variance changes.

Wine Goes, Data Stays

Much to any seasoned drinker's dismay, the wine produced by the students is discarded after it has been tasted and analyzed. The wine "goes down the drain" because of state laws and university tradition, according to Winton.

The data from the wine analyses, however, is stored on tape for future study, and 75 different wines are kept

in a wine library to see how they age over the years.

While it is difficult to tell how much wine is discarded every quarter, each student is required to produce eight wines. There are more than 155 students in the department, and all must take the course at one time or another.

Many of the California vintners, such as the Gallo and Robert Mondavi vineyards, use an automated system to rate the wines produced, experiment with new breeds and blends or maintain a quality control system.

Another automated wine tester at the university is researcher Ann Noble, who performs sensory evaluations of the wines on the computer. Statistics

involved in analyzing wine can be done by hand, but it's just too much trouble; computers are the only way to go, Noble said.

Noble's work involves separating and quantifying the wine. Using this weeding-down process of the finished product, she can split the effluent in order to determine the variables that create the various aromas in the wine.

Working primarily with Cabernet Sauvignon, Noble uses multiple regression tables to determine why something smells like a certain attribute of the wine. The work is purely descriptive analysis, with the computer used as a tool for statistical analysis techniques, she said.

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Lightwave Test Set for Atlanta

NEW YORK — The Atlanta area will be the site of the Bell System's first standard lightwave communications system, which will use glass fibers and lasers to carry voice and data among three telephone central offices, AT&T has announced.

The Atlanta system will be placed in service by Southern Bell Telephone and Telegraph Co. in the fall of 1980, according to a spokesman.

In May of this year, AT&T reported the successful one-year trial of a full-service lightwave installation in Chicago. The Chicago test involved a 1.5-mile link under downtown streets between two Illinois Bell Telephone Co. switching offices and between one of those facilities and a downtown Chicago office building.

Other experimental or special application installations of lightwave systems are slated for Connecticut, Florida and Arizona.



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Use of Encryption on Fedwire Under Study

By Jake Kirchner

CW Washington Bureau

WASHINGTON, D.C. — The Federal Reserve Board has undertaken a research and development project to determine the feasibility and cost of using data encryption devices to protect the Federal Reserve System's Fedwire operations.

Fedwire is an electronic funds transfer (EFT) system connecting "Fed" member banks around the country. With about 500 banks currently online, Fedwire last year handled 25 million transfers of funds and government securities representing \$43.2 trillion.

Three firms have developed prototype encryption devices for use on the system, and the devices are currently in use in undisclosed locations around the country.

The Fed hopes to finish up this field-testing stage of the project within the next six months, according to Richard P. Anstee, program manager for EFT planning in the Fed's Division of Bank Operations. It is hoped, he said, that the project will provide enough information to judge the benefits and costs of using data encryption with the Fedwire system.

The prototype devices utilize the Data Encryption Standard (DES) developed by IBM and approved for government use two years ago by the National Bureau of Standards (NBS). It was the approval of the DES that prompted the Fed's R&D project, Anstee said.

The availability of DES and the state of current technology suggest encryption could be used on Fedwire much more cheaply than before. In addition, now that there is a public encryption algorithm, the devices will not require a large amount of protection, lightening the administrative burden associated with data encryption, Anstee said.

However, he added, "we felt that we just did not know enough about en-

ryption or what the impact of it would be on our operations" to decide whether to use DES devices on Fedwire when the algorithm was first approved by NBS.

No Decision Yet

The Fed's Committee on Communications, which manages Fedwire, began talks last year with approximately 10 firms about undertaking a joint R&D program that would provide vendors with the opportunity to develop DES-based devices and provide the Fed with the information needed to decide whether to use the devices on Fedwire.

Anstee stressed that the project does not mean the Fed will necessarily use encryption and said there is no over-

whelming concern about the security of the Fedwire operations. No encryption is used on Fedwire at this time.

The project was undertaken to allow the Fed "to make an enlightened decision" on whether to use encryption and, of equal importance, to determine the costs of such use, he explained.

The Fed eventually chose three vendors to develop prototype encryption devices for trial use on Fedwire. Anstee would not identify them or specify where their devices are being used, although he did say they are "in actual operational situations as much as possible."

It will be some time before the final decision on Fedwire use of the DES is made, he said, describing the R&D project as "long-term."

NCR Brings Out Its Largest CPUs Yet

(Continued from Page 1)

Although no software was introduced with the systems, the spokesman said an extended version of the company's Virtual Resource Executive (VRX) will be available when deliveries of the system begin.

The bus architecture is 32 bits wide

and can transfer data between subsystems at a rate of 72M byte/sec, the company said. The bus is the link between components of the system and functions as a single high-speed data path, the spokesman explained.

Contributing to the power of the processors are the pipeline design and the microcode, the company indicated. The processor cycles at 28 nsec and uses the pipeline design to execute instructions. This design breaks each instruction into segments, or stages, for concurrent processing.

The microcode, or firmware, is loaded from a flexible disk that can be biased for different applications or languages. This allows the systems to be "conditioned" for specific languages, providing faster compiling and execution than conventional processors which are not language-oriented, the spokesman said.

The power of the processors is further increased through the use of a cache memory, or fast access buffer, which is said to reduce memory access time by a factor of six. The V-8650 supports a 32K-byte cache memory,

while the V-8670 supports a 128K byte cache.

The V-8650 uses a single medium-scale processor and the V-8670 uses two such units; these monitor all systems elements continuously. Each processor controls two CRTs that function as either operator consoles or system diagnostic units.

Either of the consoles can perform diagnostics concurrently with normal operations, NCR said.

I/O for the system is accomplished through the use of channel control processors. Two to four of these processors, each controlling up to 32 subchannels, can be attached to either system. Each channel has a 2M byte/sec transfer rate, the company claimed.

Memory cycle time on both systems is 380 nsec, according to the company, and both systems access 1G bytes per cycle.

The family of processors is based on NCR's "Migration Path Engineering," NCR said, which allows for transportation of both systems and application software from the company's smallest systems, the 8000 series and Century systems, to its largest, the V-8600.

Also introduced by the company was a disk drive with a capacity of more than 16 bytes. The Model 6550, said to offer twice the capacity of NCR's previously largest disk, has a transfer rate of 1.2 M byte/sec.

The disk drive costs \$69,000 or \$1,845/mo on a one-year lease.

A V-8650 with 32K bytes of cache memory and 4M bytes of storage will cost \$1,776,500 or rent for \$39,200/mo on a five-year rental agreement. That price includes an operator console and two I/O channel control processors capable of serving up to 16 I/O channels.

A V-8670 with 128K bytes of cache memory and 4M bytes of storage costs \$2,555,000 or rents for \$53,500/mo, also on a five-year arrangement. An additional 4M bytes of memory on what the company called "larger configurations" carry a purchase price of \$196,800.

William S. Anderson, chairman of the company, said NCR's "continuing development of advanced large-scale systems means all current users of NCR systems — from terminals to minicomputers to mainframes — are assured the widest range of compatible processing power in the industry."

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Storage Element Goes Down

DP Failure Holds Up Traffic at Three Airports

By Marguerite Zientara
CW Staff

ISLIP, N.Y. — The brief failure of a single computer storage element compounded the usual morning rush hour problems at the Air Route Traffic Control Center (ARTCC) here 12 days ago and resulted in one-hour delays for about 75 airplanes at the three nearby major airports.

The breakdowns, which occurred between 9:02 a.m. and 9:30 a.m. on Nov. 15 affected departures from LaGuardia, Kennedy and Newark airports, with the longest delay — 61 minutes — recorded at LaGuardia, according to Ian Wolf, data systems officer at the ARTCC.

The ARTCC here is one of 26 flight control centers in the country that control planes between their departure points and their final destinations.

Too Much to Handle

The runway slowdown problems were caused by the ARTCC's inability to accept the normal traffic flow within a certain time frame from the airports involved, according to Peter Nelson, chief of the Common Instrument Flight Rules (IFR) Room at Kennedy Airport.

The Common IFR Room at Kennedy, for example, directs planes from departure to an altitude of about 17,000 feet within a 50-mile radius, then hands them off to the ARTCC, Nelson explained.

"When the ARTCC's computer shuts down, it deprives us and airport control towers of the automated flight data information," Nelson said. "We still had our radar tracking capabilities here, but since our computer couldn't communicate with the ARTCC computer, we couldn't make automatic handoffs and automatically exchange data."

Exchange by Voice Lines

All data then had to be exchanged by telephone voice communications. "We could have continued to operate at very close to normal," Nelson said. "However, they couldn't accept the traffic as fast as we could give it to them, and dissemination of information out there becomes critical" because of safety factors.

Cybertek Paying Smokers to Quit

LOS ANGELES — After Vaughn Morgan, president of Cybertek Computer Products, Inc., calculated it costs his company \$675 per smoker per year, Cybertek began offering employees \$500 to kick the habit.

Morgan estimated the smoking habit consumes about 15 minutes per day, or 3% of the work year. Basing that percentage on the average \$22,500 salary paid at his firm, he figured that each employee who smokes costs the company \$675 a year.

According to the Cybertek plan, an employee who quits smoking for a year is awarded a \$500 bonus. In January, 23 employees applied for the bonus; 13 are still not smoking.

The program is strictly on the honor system, a company official said.

The precise cause of the failure is still under investigation because "the hardware fault itself shouldn't have resulted in a significant outage," according to Roland Jenkins, ARTCC sector manager.

Storage element failures are usually backed up by the automatic configuration of a "spare," Jenkins explained. Although the system did configure a spare on Nov. 15, "around that point some other things proceeded from that fault," and those failures are under investigation.

The ARTCC uses a specially configured IBM 360/65 known as the 9020E with four 128K-byte Model 9 storage elements. The 9020E is used to

process flight data for air traffic controllers' radarscope displays.

With the computer failure, ARTCC controllers worked from radar and voice contact with pilots for information usually displayed on their screens, such as altitude, speed, airline name and flight number.

No Complaints

Noting that the failure was in no way similar to the recent failure of a 9020E at O'Hare International Airport in Chicago that caused massive air traffic slowdowns throughout the Midwest [CW, Nov. 6], Wolf said the problem had never happened here before.

"You have to understand that hard-

ware fails, and the system is designed to be tolerant of hardware failures. When that occurs, normally there's another piece of equipment that can automatically, under program control, be reconfigured into the system," he continued.

The reconfiguration process causes no interruption in the operation and, "from this standpoint, this was an unusual occurrence," Wolf said, adding the ARTCC has no basic complaints concerning its computer equipment.

Officials stressed that air safety was not jeopardized at any time and that the delays were caused by measures taken to ensure the safe separation of aircraft.

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Batch System Consolidates Patient Blood Data

By Marcy Rosenberg
CW Staff

NEW YORK — A major medical center's blood bank here was suffering from hardening of the DP arteries until the center implemented a computerized reporting system that provides quick access to patient and blood usage information while sharply reducing paperwork.

For years, the blood bank at New York University (NYU) Medical Center relied on two Access Corp. mechanical card retrieval devices to store general patient information — name, blood group and type —

and data on problem patients in two separate locations.

Contained in file drawers, these systems were unwieldy and unreliable because of occasional mechanical breakdowns that necessitated time-consuming manual lookups, according to Dr. Harold Kaplan, blood bank director.

Also, a growing volume of activity — about 35,000 blood transfusions last year alone and twice as many related blood sample cross-matches — began to tax the capacity of the access drawers, Kaplan said.

Rather than spend between

\$5,000 and \$10,000 for another Access system, the blood bank turned to the medical center's own IBM 370/138 and developed a cost-effective batch mode reporting system.

Called the Blood Bank Management System (BBMS), the batch system consolidated patient information from the various Access sites into one convenient form, with added capability to generate blood usage and patient file statistics, Kaplan said.

BBMS programs were written in ANS Cobol and run under DOS/VS. All of the blood bank's files are contained on one IBM 3340 disk pack, according to Lyn Kahn, former NYU systems analyst who designed and implemented BBMS. She is now an independent systems development consultant.

The blood bank considered going on-line, she said, but it did not want to change its recordkeeping methods, could not afford to rent an off-site system and had no room to install one in-house. "We didn't have extra personnel to do data entry," Kahn noted, "and while the technologists could

have done it, space limitations precluded putting a terminal at every desk."

Designed to Fit

BBMS, on the other hand, was designed to fit the operating procedures already established at the blood bank. Data is key recorded directly from technologists' source documents, thus reducing turnaround time and transcription errors, Kahn explained.

"Originally, we were going to use optical character recognition (OCR) equipment," she said, "but at the time, OCR wasn't sophisticated enough to deal accurately with handwritten data."

Data input to BBMS includes patient blood records, summary medical histories for patients whose cases require additional demographic and historical information and blood salvage ledgers to record blood units that were never transfused.

The system outputs such statistical reports as technologist workload, blood usage by service and type of patient and counts and ratios of specific components and tests.

It also produces a directory on microfiche which is up-

dated weekly and contains demographic and problem data on all patients seen since 1972. This file allows technologists "to verify an active patient's blood group and type against past records," Kahn noted.

In the two years BBMS has been in operation, Kaplan said, it has cut down clerical work, has provided "reliable and timely access to accurate records," and, through consistency editing, has helped to guard against key recorder errors and incompatibilities between blood donor and recipient.

In fact, the system has worked out so well that the blood bank plans to use it for billing by the first or second quarter of 1979. Billing is now done via a "slip batching" procedure which requires that forms travel through three separate departments.

Charges depend on whether a patient was transfused, cross-matched only or had tests done, Kaplan said, "and since this information is part of BBMS patient records anyway, all we would have to do is add on the billing number."

On the whole, Kaplan remarked, BBMS "has made it easy for us to get valuable information in a painless way."

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West Coast Meet Set for January By Law Group

LOS ANGELES — The Computer Law Association, an organization of lawyers and law students concerned with the legal aspects of information processing, will hold its third West Coast Conference at the Hyatt House Hotel here Jan. 25. The purpose of the conference will be to update attendees in key areas of computer law, according to a spokesman.

Sessions at the one-day conference will include:

- "Protecting Proprietary Rights in Software and Hardware," dealing with the current status of the law as well as alternative forms of maintaining and asserting rights in computer programs, devices and data.

- "Managing the Disclosure of Data and Data Bases," which will present recent developments in information privacy, trade secret litigation, and freedom of information.

- "Safeguarding Data and Computing Hardware," which will address practical approaches to dealing with computer fraud, unauthorized disclosure of data and threats to physical security.

Registration fee is \$30 for association members and \$45 for nonmembers.

For further information or advance registration contact Richard L. Bernacchi, Irell & Manella, Suite 900, 1800 Avenue of the Stars, Los Angeles, Calif. 90067.

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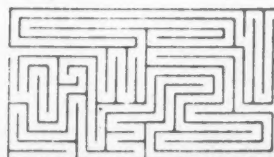
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Mail Order Firm Asks \$1 Million User Sues DEC for 'Fatally Defective' PDP-11

By Marguerite Zientara
CW Staff

OMAHA, Neb. — Omaha Steaks International has filed a \$1 million suit in federal district court here against Digital Equipment Corp. for selling the mail order food marketing firm a "fatally defective" PDP-11/34 system.

The suit, filed in June and amended last month, charges that DEC installed the equipment in July 1977 but failed to make it work for on-line order entry operations until January 1978.

The 6-month delay "postponed our whole Christmas operation, our big crunch," according to Omaha Steaks President Alan D. Simon. "We had to go to a service bureau, which cost us an absolute fortune."

The company couldn't keep up with all its orders without the on-line system and finally fell behind by "about 9,000 orders." When the system did go on-line in January, it failed to operate on more than 20 business days over the next two months, according to Simon.

DEC never gave an acceptable explanation of what was wrong with the machine, he maintained. It first counseled the user to "give it a chance," then blamed the file access system and finally suggested that the problem lay in Omaha Steaks' applications programs, he said.

In Simon's view, however, the system was simply a "lemon." The problem seemed to be in the tape drives, the CPU and the disk drives, he said. "They kept sending guys out here to fix it, but nobody could fix it," he added.

The suit also claims that DEC would neither replace the equipment nor reclaim it and reimburse Omaha Steaks the \$193,943.20 it paid for the system.

Improper Environment

A DEC spokesman acknowledged that DEC refused to replace the equipment for Omaha Steaks. "We sold it a system, having first advised it of the kind of environment it was going to have to provide for it. Omaha Steaks' problems stemmed from its failure to have provided the proper kind of environment, primarily in terms of power source," he contended.

The DEC spokesman said there were other things drawing on the line on which the system was running.

According to Simon, however, from July through November 1977, DEC could not get the system running and didn't realize what was wrong with it. "When it asked us to correct an electrical problem [in November], it was corrected within a day," Simon said, but the machine still didn't work after the adjustment.

Addressing the matter of a proper en-

vironment, Simon said that after DEC's "site preinspection," Omaha Steak's "did everything [DEC] asked us to do."

Since reliability was the key to the success of the on-line system, "it would have been stupid of us not to do what [DEC] asked."

Need for Reliability

According to the suit, "Omaha Steaks informed DEC that any breakdown in excess of eight hours would cause irreparable harm to its business and otherwise made it expressly known to DEC that . . . there was an absolute necessity for the computer system to be reliable."

The suit defined "reliability" as a system being available "not less than 99% of the time during normal business hours."

The suit maintained that "DEC expressly warranted and guaranteed Omaha Steaks that its computer system had 'proven reliability' in the field and otherwise that it would perform the job . . . intended of it."

Sold to OEM

In March, eight months after having installed the equipment, Omaha Steaks sold the system to an OEM company "for a low price," Simon said. It then used a manual order entry system until last July, when a Qantel

Corp. system was installed.

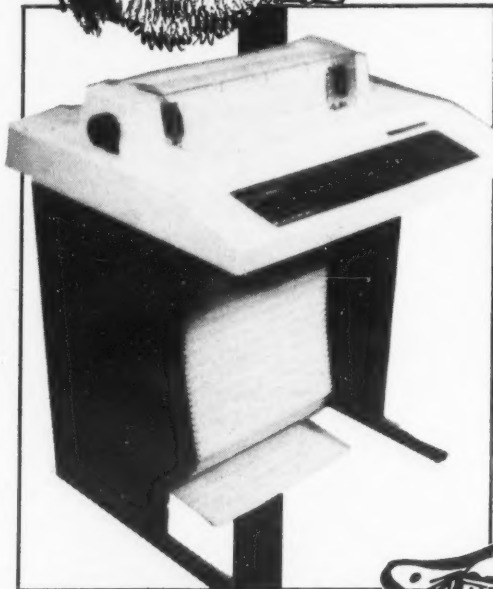
The Qantel system, comparable to DEC's in size and in number of peripherals, ran smoothly right from the beginning, according to Simon. "The only difference between the two systems was that one worked and the other didn't," Simon said.

The DEC system had consisted of a PDP-11/34 with 128K words of memory, nine VT-52 terminals, an LP-11WA 230 line/min printer, two 88M-byte disk drives and a TJE-16 tape drive.

The case is expected to be heard in federal district court here within a year.

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Air Force Tests Workspace With 'Combiman'

By Ann Dooley

CW Staff

WRIGHT-PATTERSON AIR FORCE BASE, Ohio — A computerized biomechanical man-model (Combiman), a three-dimensional mock-up of the human figure, is being used at the Aerospace Medical Research Laboratory (AMRL) here to increase efficiency in workspaces.

Many workspaces, such as airplane cockpits, have precise spatial areas, and the size of the person functioning in that workspace can often be critical to efficient operation. If a

person is too tall, short, large or small, he might not be able to function with maximum efficiency because he can't reach a control or doesn't have enough space to move around in, according to Dr. Joe McDaniel, AMRL research and industrial engineer.

AMRL has data on the physical dimensions of nearly 90,000 people in the U.S. and allied countries stored in an IBM 370/155. These representative samples of body measurements are tested by Combiman to determine which physical features would work

most efficiently within a given space.

Regular Updates

The data bank includes dimensions on people from both the military and the civilian work force and is updated regularly to allow for changing body types.

Although the Aeronautical Systems Division uses Combiman to test cockpit designs, the system can be used for any kind of seated workspace, such as that in an automobile or in a factory assembly line area, McDaniel said. It took several years to develop the system, and Air Force R&D centers are just beginning to use it, McDaniel noted.

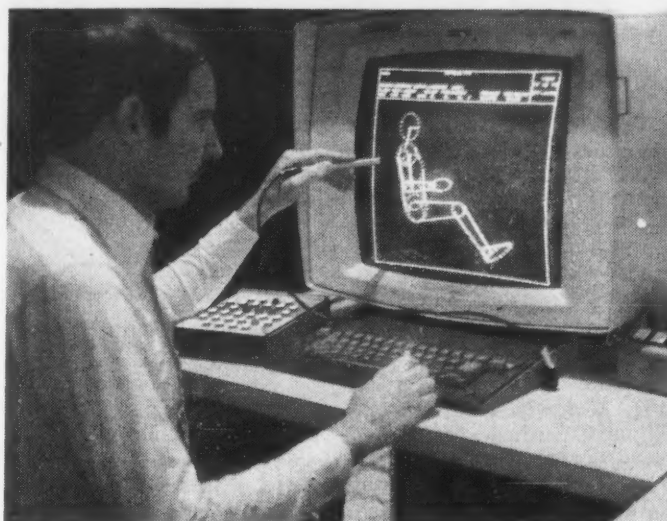
To operate Combiman, an engineer or a designer sketches the man-model on an IBM 2250 graphics display using a light pen. For hard-copy results, a Gould, Inc. electrostatic plotter is used to construct the physical characteristics mock-up on a computer printout.

Visualizing Workspaces

The three-dimensional mock-up allows designers to visualize man's interaction with his allotted workspace and how well a certain body type fits into that workspace. In many work areas, there are certain restrictions automatically imposed, such as body or shoulder harnesses or bulky clothing. The man-model can be used to evaluate these added inconveniences, McDaniel noted.

The printouts also show the worker's field of vision from a given workspace, allowing designers to determine whether there are any physical obstructions because of the workers' size. This can be very important, according to McDaniel, who said that some car drivers can barely see over their steering wheels and consequently are not in full control of their autos. Keeping full control is even more important for a pilot, he said.

When determining what body characteristics fit best in a given workspace, an opera-



Joe McDaniel uses light pen to reconfigure Combiman model.

tor calls up a menu of items of body characteristics and uses the light pen to select various options.

The three-dimensional model can add or subtract characteristics and can be redesigned quickly and easily, McDaniel said. Combiman was designed to move in its workplace — its hands and feet move and its body swivels to allow engineers to determine ease of movement.

Construction Stages

The man-model is the product of three stages of construction, beginning with the skeleton. Combiman uses a link system consisting of 33 linear segments that function the same way parts of the human skeleton do, McDaniel said.

The Combiman system then "puts meat on his bones" by fashioning ellipsoids — three-dimensional geometric forms — around the joints of the link

system. The size and shape of the ellipsoids are based on a complex combination of body dimensions and mass stored in the system.

Combiman was written in Fortran using IBM graphics and uses 400K bytes of memory, McDaniel noted.

Designers and engineers had previously used manually prepared drawing board constructions, and juggling all 90,000 physical dimension character sets required a great deal of skill. But the computer interface to the data base has greatly improved testing and evaluation times, McDaniel said, and what used to take several months now takes several seconds.

In addition to the time saved, use of Combiman has cut costs. Most manual models had to be altered — and thus redrawn — after the first tests, but now everything is done the first time on the graphics display, he concluded.

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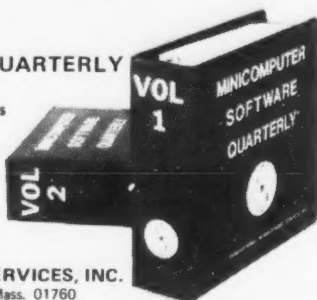
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Zilog Manager Optimistic Micro Field Booming, IBM Witness Testifies

By Connie Winkler
CW Staff

NEW YORK — The microcomputer industry has matured rapidly and is surprisingly sophisticated, easy to enter and booming, according to M. Dean Brown, manager of marketing research for Zilog, Inc. and IBM's 10th witness in the U.S. antitrust case here.

Zilog is one of the firms IBM contends have proliferated and are now vigorously competing with the computer giant.

Brown was on the stand for four days, a time considerably shortened because his direct testimony was in the form of a 27-page written statement. The written narrative technique is being tried to expedite the trial (See story on Page 14).

Zilog of Cupertino, Calif., is capitalized by the Exxon Corp., and in 1975 started selling semiconductor chips, Brown said. It has since graduated to manufacturing boards and microcomputers as well as the Z80 chip. The firm sees itself becoming a complete computer company with \$1 million in revenue by 1990, Brown stated.

Super Chip

The Z80 chip, for which Zilog is noted, is an 8-bit, single-chip CPU capable of addressing 64K bytes of memory. That super chip has been incorporated into the MCZ 1/05 microcomputer, two boxes including a Z80 CPU chip and 64K bytes of memory and a floppy disk storage box with 600K bytes of memory, and the MCZ 1/20, a one-box version of the 1/05.

Brown spent his first day in court demonstrating the MCZ 1/05 and 1/20 and five applications: a business management system written in Cobol for a food distributor, a material tracking or inventory control system written in Basic, a bookkeeping system for a gas station, word processing system and an education program for graduate English students.

Brown engaged the whole court in poetry writing with the educational program.

Embryonic Stage

Marketing of the MCZ is in the embryonic stage, Brown said, and only five of the systems have been sold. The price ranges from \$6,000 to \$18,000.

The systems demonstrated in court included Infoton Corp. CRT terminals and a Diablo Corp. 1620 printer.

The MCZ 1/05 has the programming, I/O capability, instruction set and reliability of the IBM 360/50, Brown said. Early Eniac, Seac, Univac

and Maniac machines at the Atomic Energy Commission, where he worked under contract, would take five months to do the processing a Zilog MCZ 1/05 could complete in one week, according to Brown.

On cross-examination, Brown clarified that while the MCZ 1/05 has many of the software capabilities of the 360/50, it has few of the hardware capabilities.

Future of Micros

Brown also talked about the future of microcomputers, agreeing with Data General Corp. figures that microcomputers will account for \$100 million in sales in 1978 and \$300 million in 1980.

While general-purpose or megacomputers will experience a 30% growth rate over the next two years, microcomputers will grow by 300%.

Brown, who wrote the software for Zilog's MCZs, testified about the growth of other microcomputer manufacturers in the Santa Clara, Calif., valley and about the offers Zilog had for funding. Brown is also planning his own software firm, Picodyne, to provide applications software to Zilog customers. One prospect he's excited about now is a gasoline station accounting program.

Brown's testimony was followed by a discussion of whether the government would allow IBM to introduce deposi-

tion statements from about 640 DP-related firms. IBM is expected to use the total of these firms' revenues to show that it does not have a monopoly share of the DP market.

The government objected that many of the depositions taken in 1974 do not define what is included as DP revenue. It decided, however, to allow the depositions to be presented at this time, but to reserve its motion to strike the depositions at the end of the trial if IBM does not provide adequate foundation for them. IBM says it will do that.

The next witness, Raymond J. Dubrowski, a partner of Price Waterhouse & Co., is providing totals of the DP revenues reported in these depositions.

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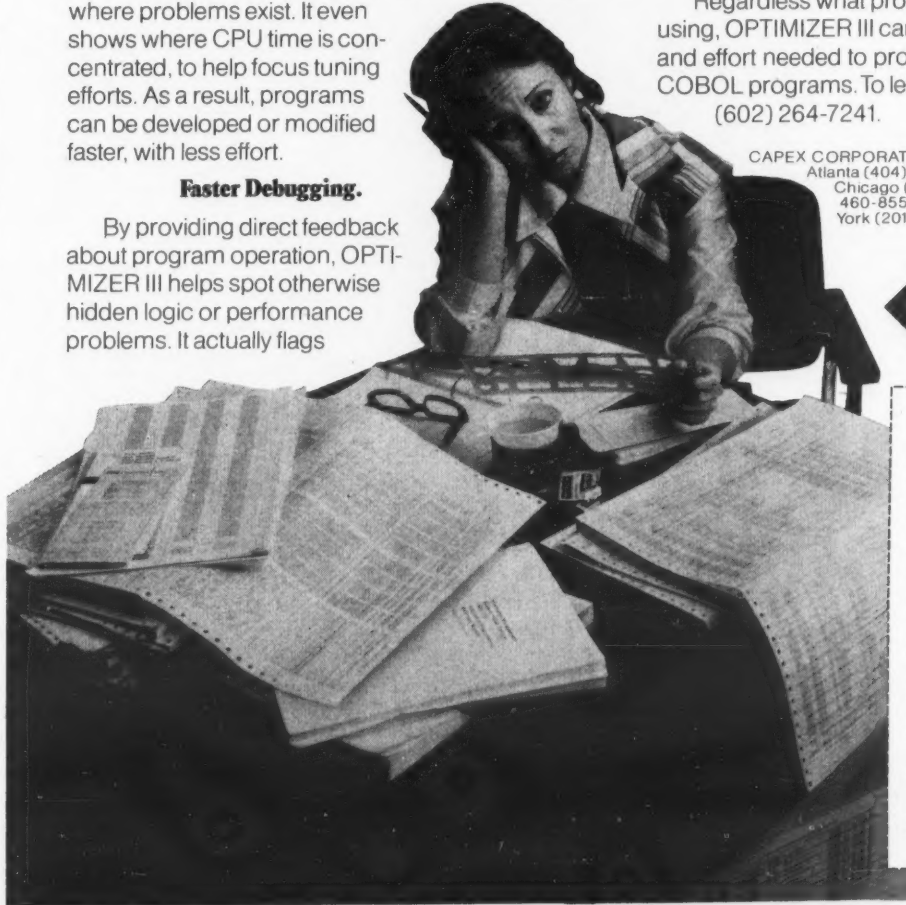
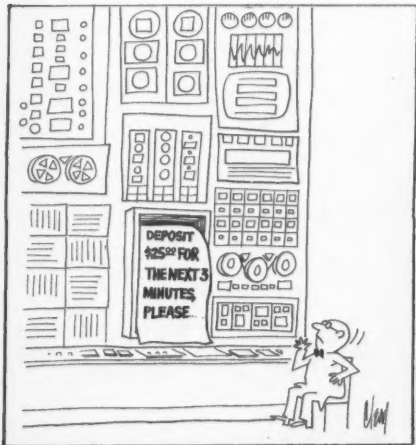
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CRTs Feed News on Laws to Multistate Firms

By Marguerite Zientara
CW Staff

COLUMBUS, Ind. — Can't sleep because you're worrying about the status of a state legislative bill that could affect your corporation?

Up-to-the-minute computerized legislative information is now available 24 hours a day in 11 states, thanks to a business centered here.

Legislex, Inc., an "early warning system" aimed primarily at major corporations, keeps terminal-equipped users in 11 states informed on such topics as taxes, the environment, computers and privacy, energy, workplace standards and product safety, according to its politically active founder, Judith Sly Head.

The topics are based on the stated

needs of people whose organizations operate in more than one state. "For example, if you are a national company and you have factories in 10 states, you need to know what the different workmen's compensation laws are and what the states' Occupational Safety and Health Administration requirements might be," Head said.

State Versions Differ

In some cases, one set of national laws may have different refinements in the states' versions. This is especially true in the area of environmental issues, Head noted.

"People might be quick to assume — and I think mistakenly — that corporations want to stop the issuance of such laws," she said. "It's much more a case

of finding out whether the law is one under which they can operate."

Four years as state president of the League of Women Voters demonstrated to Head that time is a critical factor in monitoring state legislative activity. During her term as president, businesses which were increasingly affected by state legislation asked her for data that was hard to come by.

"We could offer everyone our league state legislative newsletter or refer them to any of thousands of such available newsletters, but state legislation moves fast, and a corporation either had to have a physical presence in the state capital or rely on the numerous mimeographed sources that came through the mail a week late," she said.

After more than a year of researching

the need for such a firm and of interviewing software companies, Head organized Legislex in September 1976.

Field Representatives

Legislex presently employs two field representatives in each of 11 state capitals, including New York, California, Illinois, Ohio and Pennsylvania. These representatives monitor selected topics from the time bills are introduced until they receive a gubernatorial signature or veto.

Monitoring a bill includes tracking its committee assignment and the action on it in each house, voting in each house and any action by a joint committee of each house relative to the legislation.

In addition to tracking, Legislex offers its clients a "probability of passage" that changes weekly. The field representatives predict passage possibilities, Head said.

Each night, after the legislative sessions, field representatives record their findings with equipment — supplied by the telephone company — for input the next morning into the Legislex data base in Columbus. Head declined to describe the data collection system, calling it "proprietary information."

The next morning the information is reviewed for "quality control" at the Columbus office and then input through a Texas Instruments, Inc. 742 programmable terminal to an IBM 370/168 computer. Users can access the information at "almost any hour of the day or night" from any interactive time-sharing terminal, Head said.

Since 1978 was a successful "testing year," the system will expand in 1979 to include 47 states, "all the continental states [whose legislatures] will be meeting." The system eventually will include Hawaii and Alaska.

In 1978 the cost to users was \$2,000/year, but with the planned expansion, the price will rise to \$3,200/year in 1979. Topics covered by the system will also increase as user need becomes evident, Head said.

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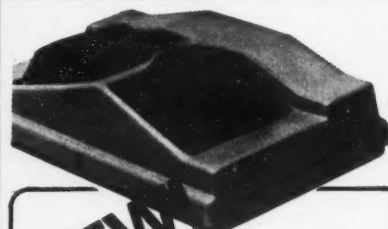
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System Aids Prosecutors

Developers of Promis Win Rockefeller Award

By Tim Scannell

CW Staff

WASHINGTON, D.C. — Charles Work, a local attorney, and William Hamilton, president of the Institute for Law and Social Research here, were recently named cowinners of the Rockefeller Public Service Award for their development of the Prosecutor's Management Information System (Promis).

The \$10,000 tax-free award was established under the sponsorship of the late John D. Rockefeller III and is administered by Princeton University's Woodrow Wilson School of Public and International Affairs.

A committee of representatives from business, education and government selects a number of recipients each year. The decision is based on the committee's evaluation of an individual's past work in the public interest, a spokesman said.

Promis was developed in 1971 and is used by more than 100 courts and judicial systems across the country. The software package is compatible with a variety of hardware configurations and essentially catalogs every bit of information that passes through a state's superior, federal or district courts.

More important, prosecutors can use the system to identify "career criminals" and multiple offenders whose cases may be buried deep within the court's already crowded judicial calendar.

Habitual criminals with cases pending are noted on a separate listing that details their previous arrests and convictions as well as any other charges for which they may be out on bail, probation or parole.

Such defendants "are usually most chagrined when they learn they've been designated as career criminals," Work stated. "They know they're not going to walk the bases and their case is going to get the attention it deserves."

Thus far, 6,500 multiple offenders have been fingered by Promis, and 94.7% of them have been sentenced to an average of more than 15 years apiece.

Study of Judicial Process

The computerized system has also revealed a number of unflattering facts about the American judicial process. Last year, a study of the information gathered from a number of Promis-enhanced court systems showed that between 50% and 77% of all the major felonies committed within the U.S. were dismissed. "They aren't plea-bargained away, they're just washed out," Work claimed.

Witnesses and victims are less apt to testify as time passes, Work said,

which means the more time that is wasted waiting for a trial, the smaller the likelihood that an individual will be prosecuted for the offense.

Promis statistics showed that Milwaukee had an average arrest-to-case disposition lag time of 229 days while Detroit's was 224, Los Angeles' 125 and New Orleans' 116.

In addition, the study revealed that of the nearly 100,000 felony arrests made each year in New York City, a little more than 3,000 are prosecuted by a jury trial. The other 97,000 cases are either dismissed, diverted or disposed of through plea bargaining.

"The American public thinks that most cases are disposed of through

plea bargaining but that's not true," Work stated. "The way that most cases are disposed of is that the prosecutor just drops them."

The effectiveness of the Promis package recently prompted Law Enforcement Assistance Administration (LEAA) officials to award \$60 million in grants to introduce the system in 33 major cities and urban areas in New York, New Jersey and Michigan, Work said.

"This is the first time in the history of the American criminal justice system that there is a data base that can be researched on a cross-city basis," the attorney said, "and startling things are coming out of the research and the

data that is bounced between cities."

Hamilton and Work were two of seven individuals selected by the Woodrow Wilson School's committee to receive the Rockefeller Award. Others cited were the Rev. Jesse Jackson, national civil rights leader, for his efforts in Operation Push; Stanley Sporkin, director of the Securities and Exchange Commission's Division of Enforcement, for administering justice and reducing crime; Margaret Snyder for her activities in international cooperation; and Benny Bailey and Warren Stumbo for improving health services and controlling health costs.

The official awards presentation will take place here on Dec. 5.

EDP professionals have a word for the new Wang VS computer.

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Richard Berger,
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"Because we had been using a computer—the Burroughs B1700—with card input sequential files and no video displays, we suffered long delays and storage constraints."

"Now, with our Wang VS system, storage is virtually unlimited, and we simply

recall a screen load of information on the CRT to make a change in seconds—all of this without interrupting our normal flow of work."

"We've put everything in our business onto our VS system, including payroll, accounting, sales and wholesale and retail inventory control. And we did it in 90 days without changing languages and with only minor modifications in almost 90 COBOL programs."

EDP professionals in more than 100 companies are singing the praises of the Wang VS. And for good reason.

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One more thing: the entry level price of the VS is under \$50,000. Which is perhaps the most remarkable thing of all about this computer.

For more information on the VS, return this coupon to Wang Laboratories, Lowell, MA 01851.

"We are absolutely amazed at the throughput rate we've achieved with our Wang VS. On our very first job for one of the country's largest student insurance agencies, the VS arrived in Pittsburgh on December 23 and was completely installed and operational on-site on February 15, with 61 programs written, debugged and tested—all by only two people—and not a single line of code had been written until the machine came in the door."

"The VS really fulfills all of our requirements, particularly in areas where other systems are weak: cost/performance, language-availability, user-utility software."

"I think the real key for the DP manager is the utilities available with the VS, its speed and its interactive COBOL compiler. These three things combined make for a very powerful tool."

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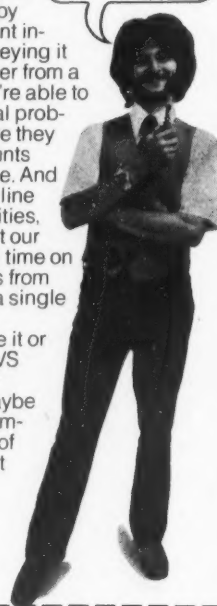
Kenneth W. Cakebread, Manager of Data Processing, Trans-Air Forwarding and Brokerage, Inc., Inglewood, Calif.

"I had 30 days to convert about 220 programs from our old batch-oriented Honeywell 62 system to our new Wang VS system. Not only did I do it: Thanks to the programming power of the VS, I actually came up with more."

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"And believe it or not, while the VS gives us faster access and maybe triple the programming efficiency of our old system, it was only half the cost."

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Better Communication on Data Flow Urged

CW Washington Bureau
WASHINGTON, D.C. — A recent study by an American Federation of Information Processing Societies (Afips) panel concluded that better communication is needed between U.S. agencies that formulate policies on transborder data flow and U.S. businesses and industry.

The panel recently submitted 12 "Observations on Transborder Data Flow" to the State Department. The observations, which do not constitute an official Afips position statement, included a number of suggestions to assist U.S. policymakers. The panel suggested:

- The first step is to define clearly the problems in transborder data flow. A statement of U.S. objectives should

then be developed so specific questions can be isolated.

- It is important to separate national concerns for individual privacy and national security from economic concerns on the part of some nations for increasing or decreasing present imbalances in data flows.

- Computer technology itself can solve problems that lend themselves to technical solutions. For example, if there is a fear that access to vital data could be denied when it is processed and stored in transnational systems, local copies of the files could be maintained and an inexpensive, "bare-bones" processing capability could be offered locally to handle at least the most necessary DP tasks.

- The U.S. should seek participation

in multilateral agreements.

- Industrialized countries should consult developing nations in drafting regulation agreements. Agreements formulated otherwise are likely to spark "adverse reactions from developing nations and Communist bloc countries."

- An analysis of experiences of international companies with nations that do not want certain data files transferred abroad might be helpful to know which countries "do not want certain data files processed abroad, period."

- One must look beyond the privacy protection issue to weigh the economic and scientific issues and the implications of restrictions on non-electronic information transfer. Transborder data

flow issues might cause "significant adverse effects on U.S. industrial growth as a whole."

- The data security technologies of individual countries cannot be depended upon with confidence by other countries "unless the techniques involved are published in open literature so they can be fully analyzed and validated by the countries [and] scientific and technical communities. Then it would be more likely that ensuing legislation would be less restrictive."

Centre Urges Week Honoring UK Informatics

MANCHESTER, England — Charging that "our overseas competitors are building their achievements on our information," National Computing Centre Director David Firnberg recently called for a British National Informatics Week.

Firnberg made his remarks at a recent seminar on "In-House Computer Solutions to Information Handling" presented by the Institute of Information Scientists and the British Computer Society.

Firnberg stressed that "national awareness is needed" of the information society opening up in the UK and in the world.

Study on CRT Hazards

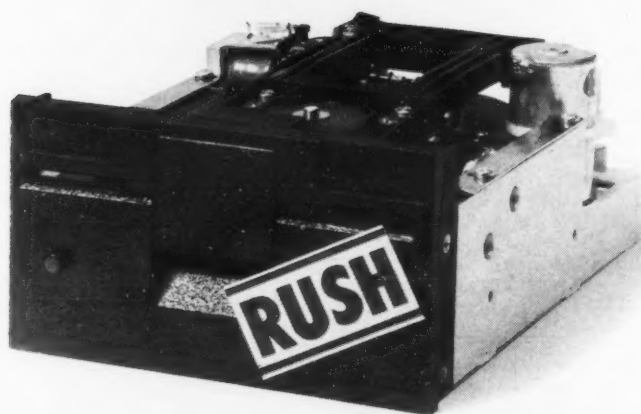
The center has also announced a study it will conduct arising from the current interest in possible health hazards associated with the use of CRTs. The study will lead to the publication of recommendations and advice regarding the selection, installation and use of CRT terminals.

In collecting information, the center is seeking case histories of both good and bad experiences from users of CRT equipment. Anyone interested in providing data can contact Paul Wilson, National Computing Centre, Oxford Road, Manchester M1 7ED, England.

In another area, the center recently created a Technical Advisory Committee to advise its director of "significant computing developments and their likely effects" to help him plan future activities.

The committee, which will meet bi-monthly, will examine the implications of Viewdata at its next meeting, emphasizing its likely interaction with DP activities.

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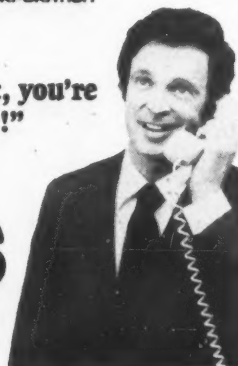
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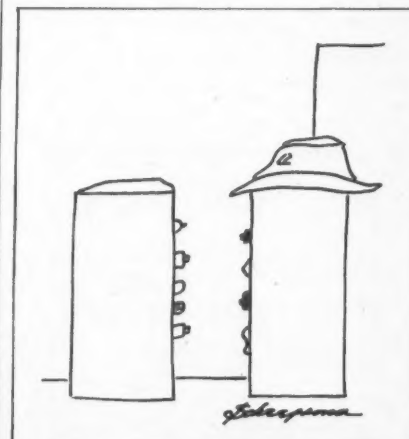
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Bartering Service Based On Terminals Tied to Mini, Works Like Charge Account

By Marcy Rosenberg
CW Staff

LOS ANGELES — An eye for an eye? Well, not exactly, but the age-old concept of trading is alive and well at a Los Angeles-based company which has come up with a computerized bartering service.

The firm, Mutual Credit, allows its clients to use their memberships like charge accounts to buy and sell each other goods and services with no cash changing hands, according to Thomas Skala, president.

While there are other bartering clubs around, Mutual Credit claims to be the first to tie the concept of bartering with today's credit card system and modern computer technology.

For its own recordkeeping, the firm uses a central processor at its headquarters here to handle inventory control, billing, payroll and accounts payable and receivable. The CPU backs up microcomputers which perform similar accounting functions at each of the firm's 20 branch offices.

The company also provides terminal services to its clients for 24-hour, seven-day-a-week direct communications with its Credit Clearance Department and/or Customer Service Department on a toll-free basis. Members can rent terminals for a \$50 installation fee and \$10 monthly service charge.

Payment in 'Futures'

Skala outlined how his financial service works. If a lawyer, for example, joins Mutual Credit, he deposits \$200 in an account, receives a Mutual Credit Moneycard and is added to the member and service directory that is distributed to all members.

If a member travel agent needing legal services sees the lawyer's name in his directory and decides to use him, the agent would "pay" for, say, a \$400 legal fee with his card.

Payment, however, is not in cash, but in "futures," each of which is worth \$1. The attorney's account in the main computer is then credited with 400 futures (plus the 200-future deposit) that he can "spend," either for services from a professional or goods from a store.

The travel agent's account is debited 400 futures, meaning he agrees to provide \$400 worth of travel services to any other member of the trading pool.

The price of barter services is set by the trader, Skala said. Mutual Credit charges the buyer an 8% service charge for each transaction and the seller 5% to cover bookkeeping and directory publishing costs.

IBM 360 Traded for Mini

Until a year and a half ago, Mutual Credit used an IBM 360/30 "which was set up for batch processing and was shared with another company," Skala noted. "With the IBM system, we had to do credit holds manually and also had to keypunch to get a computer printout which was not up-to-date."

About that time, Mutual Credit was acquired by Sntcor Corp. of Las Vegas, which, through a subsidiary, Sntcor

Electronics and Communications, assembles equipment for credit clearance service and electronic funds transfer applications.

Sntcor built a 1.2G-byte minicomputer system for Mutual Credit that "gave us on-line capability and was faster than the 360/30," Skala said.

Called the Sntcor 15, the system uses a CRT terminal for input and output and disk files "so we can add more memory," according to Skala who declined to name the firms that supplied the hardware. Sntcor, he noted, manufactured the printed circuit boards and interconnect equipment.

At all branch offices, Mutual Credit installed 48K-byte Sntcor 10 microcomputers which store the regional customer information needed to perform inventory control and accounting procedures.

If any branch's member list grows to the point that "the application is bigger than the computer's memory capacity," Skala said, "the operator can push a button to tie in his Sntcor 10 to the Sntcor 15 to get additional storage capacity on a time-sharing basis."

In about a month, Mutual Credit plans to upgrade the 15 to allow clients to communicate directly with the computer by push-button telephone. Clients will then be able to dial into the computer through a special toll free number.

Once connected, a member could find out his present balance by keying in the word B-A-L-A-N-C-E and his account number or could locate a member for any service he needed by keying in works like G-A-R-A-G-E B-O-S-T-O-N or H-O-T-E-L L-A-S-V-E-G-A-S.

The computer will be able to reply in English over the phone to supply the desired information, according to Skala, who declined to give specifics about how the system will be upgraded.

Direct-Line Terminals

Mutual Credit's terminal service uses Sntcor terminals which are direct-line communication devices that resemble push-button telephones, Skala said.

The Sntcor 1 terminal has a button that ties it to the firm's Credit Clearance Department; a Sntcor 2 contains a second button to tie into Customer Service.

Among the other terminals rented to clients is a Sntcor 4 that looks like an electronic calculator with a slot to take not only the Moneycard, but also most major credit cards. The user (or seller) can slide in the potential buyer's card and key in the amount of purchase.

The terminal reads the buyer's account number from a magnetic stripe on the card and, linked to the main computer, can verify the card and display the current balance in about 10 seconds, he noted.

Skala, who works in cooperation with several major credit card companies and banks, said Mutual Credit plans in about 30 days to make the Sntcor 4 and several other terminals available to the general public. Prices will be about \$5,000 and monthly rental fees will range from \$10 to \$50.

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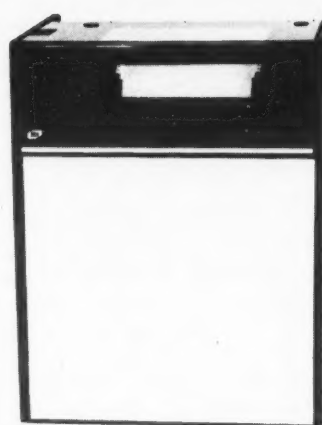
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Editorial

The Untapped Resource

The computer field has often been described as young and vibrant with plenty of opportunity for everyone, yet it seems plagued with some of the same sex discrimination problems common in other fields.

This "represents a severe loss of scientific talent," as Joan Callanan, manager of the National Science Foundation's (NSF) Women in Science Program, has pointed out [CW, Nov. 20].

Men outnumber women by more than four to one in upper echelon DP jobs (systems analyst or above), according to recent surveys, and the percentage of women receiving degrees in the computer sciences is even lower.

Sex discrimination is, of course, not a new phenomenon but its presence is more surprising in the computer field than in more tradition-bound areas of society.

After all, many of the pioneers and real leaders in the computer profession have been women — Grace Murray Hopper and Jean Sammett come readily to mind.

But perhaps the opportunities for women were better when the field was brand new and little understood by most people, and as it became an established discipline, it became more like society at large, adopting the discriminatory hiring and promotion practices of Ameri-

can business.

This type of discrimination is not only illegal now, it is just plain stupid.

Data processing departments only hurt their overall effectiveness when they discriminate against anyone for any reason. Ignoring talent or relegating it to the backwater of the department hurts the entire operation. In this business, perhaps as in no other, talent should be the only criterion for promotion and success.

As a first step toward clearing up the problem, companies and DP departments within companies should evaluate their own procedures for hiring and promotion and eliminate any built-in biases.

Another way to help increase the pool of talented women would be to support the NSF's Women in Science Program, which sponsors workshops around the country to provide career information for women and advice on preparation for jobs in specific fields.

In the past, these workshops have featured women panelists and participants from industry and government, Callanan said, and she urges companies wishing to participate to contact her.

If DPs get involved in such efforts, we may be able to attract more women to our field — and DP needs all the talent it can muster.



Letters to the Editor

Ability Not Guaranteed

In his letter in *Computerworld* [Oct. 30], Ben E. Olive, associate general counsel for NCR Corp., stated that NCR customers' "ability to resell equipment is not dependent on NCR's goodwill but is guaranteed."

Perhaps he can explain how this is true when NCR attempted to establish a maintenance policy last year which stated: "It is our policy, therefore, that Field Engineering Division will not service products or equipment sold or leased by organizations other than NCR unless a corporate contractual business relationship exists between NCR and the third party. This policy pertains to products which may be similar to or exactly the same as that marketed directly by NCR sales representatives."

DP equipment without maintenance is worthless. NCR could be the only beneficiary of such a policy. Fortunately, NCR users were informed of this attempt and raised such a furor that NCR backpedaled through two more versions to the present watered-down version of the maintenance policy.

Even this latest version issued in October of last year provides no guarantee that users may sell their NCR equipment and have NCR maintenance continued.

I am sure NCR users would like to see the guarantee that Olive alluded to. So far, they have only seen attempts to guarantee that only NCR would be capable of selling used NCR equipment.

G. Cimo

Costa Mesa, Calif.

Surprised at Report

I was surprised to read "Don't Be Lulled Into False Security by Minis" [CW, Oct. 23]. Daniel C. Zatyko of Basic/Four Corp. was quoted as saying that we have re-

placed a large mainframe computer with three minicomputers and that we use a service bureau, none of which is true.

The University of Alabama Hospitals has an IBM 370/148 with an IBM Series/1 minicomputer attached. We have not downgraded our system nor do we plan to do so.

Mary Nell Spraberry
Assistant Administrator
Health Data Systems

University of Alabama Hospitals
Birmingham, Ala.

Zatyko responded that during his presentation at the Fifth International Information Management Exposition and Conference he was referring to an article published in *The Office* in September, 1978 about the University of Alabama. At the same time, he neglected to remove one of the slides he was showing which described a general solution to a hospital system. Inadvertently the two subjects became overlapped.

According to Zatyko, the University of Alabama Hospitals has two Basic/Four Model 400 computers which communicate with an IBM 360/65 at the Computer Service Corp. in Birmingham.

The two Basic/Four systems, Zatyko said, are installed in the Department of Medicine and the Department of Obstetrics and Gynecology. Ed.

Data Past

Five Years Ago Nov. 28, 1973

WASHINGTON, D.C. — With the unanimous vote of the Federal Communications Commission, Packet Communications, Inc. (PCI) gained approval to become the first company to provide packet-switched services to users.

LOS ANGELES — IBM countered California Computer Products, Inc., charging that the firm had monopolized the market for digital plotters and had therefore kept IBM from entering that market.

The suit came in a week of hectic legal activity by the IBM legal team, in which it dealt with all of the members of the plug-compatible peripherals market presently suing IBM.

Eight Years Ago Dec. 2, 1970

DETROIT — After two troubled elections, the city's Common Council voted to "dump" the use of punch cards and ordered the city's attorneys to bring suit in the amount of \$1 million against Data-media Computer Services, Inc., the Dallas-based firm that had brought punch-card voting to Detroit.

WASHINGTON, D.C. — A spokesman for the Internal Revenue Service (IRS) announced that the IRS, upon request, would compute the tax of any taxpayer who earned less than \$20,000 and took the standard deductions on the 1040 form. The aim, the service said, was to reduce the errors officials found on 3.6 million of the 78 million returns filed for 1969 income.

Computerworld welcomes comments from its readers. Preference will be given to typed, double-spaced letters of 150 words or less. *Computerworld* reserves the right to edit letters for purposes of clarity and brevity. Letters should be addressed to: Editor, *Computerworld*, 797 Washington St., Newton, Mass. 02160.

The Human Connection

AT&T Putting Energy Into Marketing Plan

By Jack Stone
Special to CW

Seeing John deButts meander down that hallway on national TV sparked my interest in what AT&T was up to. Then the ads for the Dimension line of electronic PBX "systems" extended my curiosity. But it was the article in the September issue of *Fortune* magazine ("Selling at AT&T Is No Longer Mickey Mouse") that encouraged me to develop this column about the significance of AT&T's changing marketing strategy.

In a nutshell, the article said that legal and regulatory decisions during the last decade have given rise to considerable competition for the grande dame. As a result, Ma Bell has come out of the closet with a fighting posture, telling the industry and the marketplace that she will be, in fact, responsive to customer needs and that AT&T will, in the words of Chairman deButts, become "a marketing organization."

I don't know how you look at it, but to me, when a huge company — about four times the size of IBM in terms of assets and employees, with a technical competence which supports, only as one example, a communications network of upwards of 150 million terminals (the U.S. telephone system) — says, in effect, that past marketing efforts have

been fun and games and that now it's going to take it seriously, well, watch out!

It simply has to happen that Bell's actions will create colossal changes in the marketplace as its new marketing philosophy takes hold.

I had the opportunity to interview Philip F. Pagano, a marketing manager at the AT&T "1776" facility in Morristown, N.J., who is responsible for implementing one of the many programs that constitute the redirected Bell System marketing thrust.

Q: What is the central theme of your company's recent marketing pronouncements?

A: It is simply said in our new slogan, "The System is the Solution." Underlying this statement are Bell System action programs designed to replace its old image as a supplier of communications equipment and services with one that is much more appropriate: a supplier of systems solutions for the communications problems of business, government and residence customers.

Major changes are taking place in all departments, including engineering, operations and maintenance, to help ensure a coordinated, corporatewide response to customer requirements.

Specifically, AT&T has just announced a major corporate reorga-

nization that represents a radical shift away from its traditional alignments of 60 years. Now we are structured into three segments: business, residence and network services. Each segment brings together into one self-contained unit, for the first time, all the people and functions needed to properly serve its customer set.

Q: What is specifically happening in the marketing arena?

A: The corporation began studying the marketing organization nearly five years ago when it was determined a new approach was needed in the long term if we were to meet the growing and complex communications requirements of our customers.

A major milestone was reached last year, when AT&T released a set of guidelines, termed the "Bell Marketing System," for streamlining marketing operations for business customers.

This system emphasizes industry specialization of the marketing force. It recommends team marketing, in which the account executive receives strong support from technical specialists permanently assigned to the field marketing organization.

It brings our marketing operations up to date by addressing such matters as revenue planning and com-

mitment, account planning and implementation and the measurement and control of marketing operations.

Q: What is your particular area of responsibility?

A: My group has the task of developing the "delivery system," a comprehensive set of plans and programs whose objective is to assure the marketing success of major new products and services.

We work closely with our associated companies and AT&T departments to make certain new offerings are announced and supported in a highly professional manner.

In many ways, the delivery system helps prepare the sales team to function as a true communications problem-solving operation.

Q: How would you characterize the progress the Bell System has made toward its new marketing goals?

A: Well, for a company the size of ours, I feel we've made great progress in the past several years. But with the recently announced reorganization, I believe our marketing effectiveness will rapidly accelerate.

Letters to Stone should be addressed to him at Suite 222, 2233 Wisconsin Ave. N.W., Washington, D.C. 20007.

The Taylor Report

Managers Must Delegate Security-Related Tasks

By Alan Taylor
Special to CW

At this month's New England Internal Auditors' EDP Clinic, one auditor asked me what to do when management ignores or brushes off repeated reports of an unprotected computer site.

The security question has two sides, the obvious and the historical. A computer site that allows uncontrolled access is an obvious risk, and auditors are supposed to report such risks to management.

But after the report arrives on the manager's desk, few auditors can point to a prior case in which ignored risks resulted in a major loss. Historically, from management's viewpoint, DP audit literature is full of cries of "Wolf!"

Most computer sites I see are unprotected in any formal sense, and a DP auditor would regard security as inadequate.

Whose Responsibility?

What is really at issue here is not that the site is unprotected but that when the auditor points out to management that protection is needed, he gets a lot of flak. In essence, the DP department is saying, "This is none of our concern."

It is generally believed that the function of the DP director is to get the job done with the resources and facilities supplied to him. It is not the director's job to change sprinkler systems, for example; this is often the responsibility of the landlord's building maintenance department.

"I was hired to get the reports out and see that new systems are implemented," is the routine and understandable director's comment. But such a response is no help to the DP auditor.

One way to deal with such a brush-off is to track back in history to discover just who put the computer room over a fire hazard — like the cafeteria kitchen — without a sprinkler system. Perhaps the computer room opens onto a stairwell that people can enter without being challenged; who planned it that way?

From experience, I would say that approach rarely works. The building maintenance department will say the computer people agreed; the computer people will insist it was the only place where they could get in the equipment and that no one told them a kitchen was going to be put in under the tape units.

Any auditor who willingly
(Continued on Page 22)

Reader Commentary

Executives Taking Stock Of Future DP Situation

By Phillip G. Elam
Special to CW

Virtually no one could foresee the impact commercial data processing would have on the American business community when it made its debut some 25 years ago. While the past is not that important to us, it is important to review the last two or three years and then take a look toward the future.

In 1976, revenue from computer manufacturing and services was \$38.4 billion. That accounted for more than 3.2% of the gross national product. Experts are now predicting \$64 billion in revenues by 1981, and 1985 will bring revenue levels to 8.3% of the gross national product.

Probably the most alarming factor in these rising costs is related to the people cost of technology. Some 10 years ago the average cost per line of program code was \$6 to \$7. Many organizations are now citing costs as high as \$71 for the same line of code.

Budgetary analysts say that 10 years ago, DP costs were limited to 1% to 3% of the overall corporate budget. Costs have now risen to between 12% and 15% in many organizations. Hence, upper echelon executives are taking a much more active interest

in what their respective organizations are getting for their DP dollar.

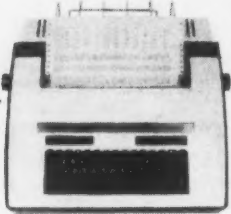
One industry expert has evaluated the cost of data processing in an effort to determine where organizational money is really being spent. His findings were startling in that up to 70% of the average DP budget is directed toward people costs in some organizations.

And the end is not in sight. If this trend continues, people costs could go as high as 90% of the overall DP budget by 1985, making DP the world's most labor-intensive industry, with the possible exception of agriculture.

But hardware costs are expanding too. True, the cost of computing (i.e., problem-solving potential) may be decreasing on a per instruction cost, but the actual amount of money spent is increasing. In fact, of the \$38.4 billion spent on DP in 1976, some \$20 billion was spent on hardware and related hardware vendor services.

Another factor that has contributed to higher DP costs is the computing technologist. Very few other professionals have had their salaries triple or quadruple since the late '50s. It is frighten-

(Continued on Page 20)



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Executives Taking Stock Of Coming DP Situation

(Continued from Page 19)

ing for organizations to realize that for the last decade, these high-priced personnel have (in all too many cases) done nothing more than participate in upgrades and conversions in a never-ending attempt to keep pace with expanding hardware technology.

And according to studies released by the federal government, the demand for these personnel will skyrocket by 1985.

Where does that leave the corporate executive? How can he hedge against these inevitable inflationary trends?

One alternative relates to a new level of technology in the software area which can turn the need from expensive and time-consuming programmer training to the training of users at an intelligent terminal.

This will have two effects on an organization. First, the end user will no longer need to rely on DP personnel to program routine information requests. And second, the computing technologist will be freed to handle the organization's more complex information needs.

Obviously, this will require a completely diverse approach to most commercial software package offerings now on the market.

And that brings us to the executive's second alternative: acquiring external software.

Most Important

Decisions related to software acquisition will probably become the most important made by a corporate executive. In fact, it is paramount that the executive initiate a strategy to increase programmer productivity and provide a more effective price/performance ratio. This is highlighted by the fact that most organizations have already established a comprehensive corporate repository of data, whether in the form of a commercial data base package or some other approach.

And technology is demanding that the next moves be in areas relating to telecommunications, minicomputers and distributed processing. Hence, the critical path for DP in the next decade has already been established.

Both hardware manufacturers and independent software vendors realize this. In 1976, about 10% of DP expenditures were for software. Many industry analysts indicate an annual increase in the acquisition of software packages in the range of 28% each year for the next five years. And this revenue opportunity is prompting software producers to ensure that their products add value to computer hardware and communications resources to serve the needs of the end user.

Software solutions for the future must address the total information system problems of the entire organization, not just isolated areas. Data processors must be relieved of mundane, redundant technical support activities and permitted to become effective organizational problem solvers.

And future software must also in-

clude those tools that make it easy for the corporate and user to satisfy information requests and solve the many daily problems organizations face.

Most important, however, executives will no longer have to deal with raw data — they will have meaningful information at their fingertips and can therefore make intelligent, informed command-level decisions critical to the organization's survival.

Information as Resource

Unfortunately, there is no single source for software comprehensive enough to satisfy all of an organization's information needs. And, quite probably, there never will be. But virtually every supplier of software products is busily engaged in defining and building tools to satisfy the next level of computing technology.

But more important than any level of technology is that organizations will begin treating information as a resource. The same level of management attention will go into controlling, protecting and using information in much the same way as any other perishable asset.

Many corporate executives with insight into tomorrow's computing problems (and opportunities) have already realized that sizable investments will be made in the area of software. And for that reason, they have directed their legal and financial staffs to investigate such areas as product deductibility and costs available for investment tax credits.

To date, most research has been inconclusive, since the federal government prefers to treat software investments as tangible property, while most states and local government agencies treat software as intangible.

But fortunately, organizations are outgrowing the mystique of the computer. They are moving from data processing to information processing. Actually, we have an information resource economy today. Industries are spending a total of \$40 billion on computing each year. When we add telecommunications, the cost is more than \$60 billion.

And if we add the costs of office personnel and equipment, the real users and support for information resources, the costs soars to more than \$150 billion. But even that is small in comparison to the staggering \$500 billion that is spent each year in this country on information resources in total.

The challenge, therefore, is to increase planning at all levels, to anticipate changes brought about by the future, to consider rethinking traditional organizational structures, to unify all operations dealing with information resources and to focus on the controls needed to manage the tremendous levels of information that will be required to run organizations and institutions in the future.

Elam is manager of communications support services at Cincom Systems, Inc., Cincinnati, Ohio.

Article Missed Points Made in AUUA Keynote

In the coverage of my Americas Univac Users Association (AUUA) keynote address ["Lecht Predicts 10-Fold Price/Performance Gain" (CW, Nov. 6)], several points were stripped of their qualifying commentary and could be subject to misinterpretation.

First, while I did say a 10-fold price/performance gain seemed to suggest the upper limit of large-scale uniprocessor technology expectations, the emphasis of my speech was on the fact that an upper limit was being encountered rather than on the 10-fold price/performance gain. I said it was hard to imagine uniprocessor technology exceeding 10 Mips as currently packaged and with current materials, for example, with circuit heat packaging limitations.

Even if it were possible, long before we could expect to see such processors in the general-purpose marketplace, the cost of achieving such price/performance ratios would be too high.

Any uniprocessor operating even in the low-double digit Mips ranges could be expected to fulfill specialized scientific needs, and probably will not be seen in the commercial arena as a general-purpose commercial machine until Josephson Junction technology is perfected in the late 1980s.

Second, I did predict that the minicomputer business did not have a bright future, but the context in which I made it is extremely important to its meaning. The 1980s will see a time when people can obtain computer power in essentially any amount they want delivered by public or private utilities.

Since this continuum of power is anticipated to cover all ranges of today's systems and more, there will be no reason why we should continue to distinguish the mini-

computer business as a unique product category. The classic boundaries of micro, mini, midi and maxi mainframes are blurring so swiftly that modern systems like IBM's System/38 defy such categorizations.

With nearly the power of an IBM 370/158 on a single board, one would be hard pressed to label it a mini notwithstanding its mini range price. Thus, my remark was made to point out that yesterday's minicomputer business definitions which related price to word size, physical hardware size, memory size — even Kips — are rapidly fading.

When reporting on today's swiftly changing computer industry, news-

persons must suffer the same semantic difficulties as users do in understanding its products.

Charles P. Lecht

New York, N.Y.

More on Transpositions

Robert B. Higgins' recent rebuttal [CW, Nov. 6], to my article, "Locating Transposition Errors" [CW, Oct. 9], certainly presented some worthwhile concepts and well thought-out extensions to my original presentation.

I hadn't specified that a "divisible-by-nine" condition could be caused by other than a single adjacent transposition because I assumed — perhaps incorrectly — that it was

obvious.

Higgins was quite right that the Cobol example as provided was not correct. The "S" in the picture of REMOVE-DETAIL-SIGN was an unfortunate typographical error. I had hoped the name of the field would allow readers to figure this one out for themselves.

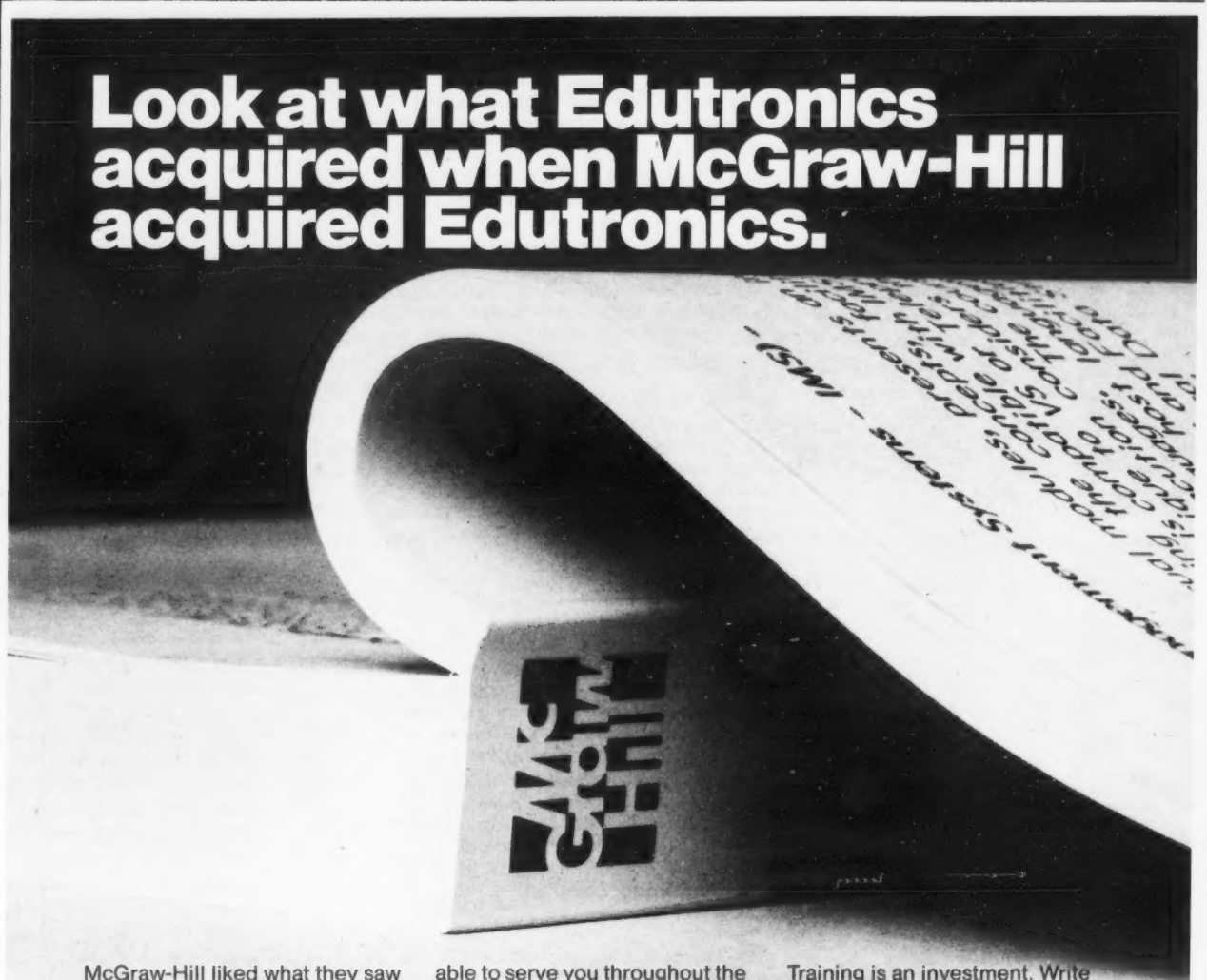
One thing I still don't understand is Higgins' statement: "The code, however, carefully counts from left to right..." The code is actually counting nothing but the number of divides required to isolate the mantissa. I think a little desk checking will verify that it is correct.

My original intent of presenting a new idea has been satisfied. However, readers who are interested in implementing this idea would be well-advised to carefully read Higgins' presentation.

Irwin F. Kraus

Kansas City, Mo.

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Column on Banking Woes Rings Bell With Reader

I feel obliged to respond to "Banks Using DP to Avoid Facing Customers" by Kenniston Lord [CW, Oct. 23].

First, with respect to the Baybank/Newton-Waltham, in six years of banking there (it is one of two banks I now use) I have had zero problems. However, we as a family had excellent rapport with over-worked Bob Hart, the Sudbury, Mass., branch manager who was the "real person" between us and the computer.

Second, the prize I have framed is a check from an Arizona Bank for \$49.10 as payment for expenses I incurred as a result of the bank's not following its own policy. My daughter had a checking account there while working on a college work-

study assignment. At the termination of the assignment, my daughter and another student were to go to Mexico City and received a check for expenses from the college (Antioch).

The bank refused to accept it until it "cleared," which would not be until three days after they had to depart. We were called and sent a cashier's check from Newton-Waltham to the Arizona bank, which the bank again refused to accept.

I billed the bank for the cost of the phone calls, the extra expenses we incurred and the extra expenses my daughter incurred informing the bank that I had no intention of paying for the bank's protection when it

had a clear and valid credit check on my daughter when she opened the account, and that data was in its computer records. I happened to have consulted for several West Coast banks and knew the internal policy of this bank.

And third, the worst foul-up involved American Express (would someone like to write a set of American Express horror stories?). I lost my card. The company gave me a new card number by phone (it took five weeks to get the real card).

I was in the midst of arranging a complex trip through its travel subsidiary. It refused to accept the new number.

Then when I used the new card for the first time - entertaining some

Swedish government guests at the lounge at Logan Airport in Boston, the new card was siezed because it was on the "missing list" and the lost one was OK. Very embarrassing. I didn't even get a "sorry."

Finally, *Computerworld*: I moved in June. New address sent in a month ahead. No CW. Four tries later I wrote to the president. I think the mail service found it difficult to find (no address) HARBOR HARBOR Washington, 98335. There are only about 40 harbors in 98335 and several hundred around Puget Sound.

William B. Helgeson
Gig Harbor, Wash.

Letters to the Editor

Chamberlain's Affiliation

I enjoyed reading the recent articles by Robert Chamberlain on data base administration and a functional business definition for distributed processing [CW, Sept. 25, Oct. 23]. However, it should have been mentioned that Chamberlain is national manager of technical support for these areas and part of Coopers & Lybrand's National Management Consulting Services.

Walter J. Dick
Partner

Coopers & Lybrand
New York, N.Y.

Jobs Must Be Assigned

(Continued from Page 19)

plunges into such a morass needs his head examined. It is not an auditor's job to find out what went wrong, simply what is wrong. And what is wrong here is no one is accepting responsibility for the security question.

Job Descriptions

The real problem may be that management has not clearly delegated the task of keeping the computer site secure.

An auditor should not attack, even by implication, the performance of the DP department until it is made clear who has what responsibilities. This information should be in the job descriptions.

When that disgruntled auditor asked me at the November meeting what he should do about the management brush-off, I should have told him to check the job descriptions. If he found that management had failed to fully define responsibilities, he should have reported it.

The auditor's report should point out the danger of not clearly allocating the responsibility for physical security. Often the duties of a DP director appointed to run a site that has already been put into operation are especially vague.

Next year, if that problem has not yet been corrected, the auditor can use a different example; who has the responsibility for checking that a backup facility can really take over if the central system is down?

Try checking job descriptions. You may find that using this approach you can accomplish more.

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In particular, if you have a minicomputer system with several terminals in one remote site, you are probably paying a fortune in communications costs, operating the terminals slower than you would like, and learning to live with the occasional phone line 'glitch' which drives your CRT's crazy. Why not talk with some of our Micro800 customers, supporting four 2400 bps CRT's on a single 2400 bps line, glitch-less! ... and take advantage of our Hewlett-Packard, TerminiNet® and DEC-writer® options.

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Supports 1,700 Stores Package Tunes Retailer's DP Operation

DALLAS — Planning, scheduling and controlling the efficient use of resources is an understandably challenging task at the corporate computer center of **Zale Corp.** The nationwide retailer in such diverse fields as drugs, shoes, jewelry and sporting goods has assigned to its data center the responsibility for payroll, inventory control, automated warehousing, on-line credit and automated inventory adjustment for some 1,700 units nationwide — in addition to the

usual business accounting tasks.

The center receives input from subcenters in New York and San Antonio, Texas, as well as from point-of-sale terminals in the stores. With an IBM System 7, the center queries stores nationwide each evening to adjust inventory automatically on the basis of the day's transactions.

But "the center's main systems are an IBM 370/158 and a 370/145, and they are working four shifts, six days a week, staffed with 140 people," accord-

ing to John Granger, systems resource analyst. "It is a continuing responsibility to devise more efficient and economical ways of using these resources of people, machines and time."

"There was a feeling here that the growth of capacity was getting out of control, that we were using up our computer resources and the only way out seemed to be a costly 'more,' which was not economically acceptable. We looked for a better way."

That "better way" was found

with the installation of a Data Center Scheduling System from **Value Computing, Inc.** which, Granger said, "gives us tight control of our CPU devices, enables us to put a clamp on the upward spiral of costs and move jobs in and out faster than we could before."

Input to the scheduling system is the logged accounting data from the operating systems. This data is captured automatically and saved on these files.

The system builds job and step profiles from this data and employs techniques to purify the production statistics from testing, Abends and reruns. Exponential smoothing techniques are used to keep wide deviation of runtimes, for example, from distorting the data.

"Schedules are produced on week-ends for the following five work days," Granger reported. "With VCI's Valu-Gen system, report sheets are produced which give a breakdown for each of the five days according to the person who is to run the individual jobs. These individuals make whatever changes are necessary and, on a day-by-day basis, return the

(Continued on Page 24)

'Liber 8' Manages Distribution Of Technical Manuals, Documents

GREAT NECK, N.Y. — Developed to help IBM-oriented programming staffs keep track of their technical libraries, the **Liber 8** package from **Labyrinth Systems Ltd.** is said to automate the recordkeeping and cross-referencing needed to eliminate unnecessary duplication of manuals and newsletters while making sure that needed literature gets to where it is needed.

Frequently the problem with manuals is not their scarcity but their overabundance — especially when bulk shipments of updates are received at a central site under a subscription service — with no clear knowledge of who needs them, where and why, a Labyrinth spokesman said.

The package provides the technical librarian with the facilities to build a data base, identifying exactly who has what manuals and which are on subscription service. From this base, the librarian can extract a list, and mailing labels if desired, for the appropriate recipients as soon as a shipment of manuals or newsletters is received.

The system is also capable of producing lists showing where various manuals are currently being distributed. This facility could be very useful for those times when disk drives, for example, are being installed and the documentation for the old peripherals has to be replaced as well, the spokesman suggested.

The initial creation of the data base is probably the toughest part of using **Liber 8**, he said, noting that most installations have been "rather casual" about where incoming manuals go and how many are actually needed or being used.

Once that is done, the file maintenance is built into the system. The librarian simply indicates that a given manual has been received; the software updates the

intended recipients' records and produces mailing labels with as complete an address as is in the data base for each recipient.

The package functions under DOS/VS and will "run like crazy" if given a 132K-byte virtual partition, though it can be used in as little as 102K bytes, according to Labyrinth.

The software costs \$1,500 and can be ordered from 17 Barstow Road, Great Neck, N.Y. 11022.

'MSI' Protects Shared DASD Files

NAPLES, Fla. — The Multiple Systems Integrity (MSI) package from **Allen Services Corp.** is said to guarantee file integrity across IBM systems accessing shared direct access storage devices (DASD) while operating under any of IBM's OS or OS/VS environments.

MSI is not a security package, a spokesman emphasized. Rather, it solves data integrity problems caused by simultaneous access of the same data by more than one system, and it improves overall system performance by allowing more flexible scheduling and by eliminating many prolonged DASD reserves, he said.

The hazards of simultaneous updating by operating systems in a single-system environment have been recognized. But internally enqueueing the name of each active data set under the

SSDSN major name — the usual protection mechanism — does not span intersystem activity, and it is very easy for users in different systems to concurrently modify the same data set, the spokesman asserted.

'Unified System'

MSI relieves users, programmers and operations personnel of trying to cope with the problem. Instead, it returns the means of handling the problem to the operating system by propagating internal control information from each system to all others that share common DASD.

This "unified-system" approach to integrity can be utilized with "any number of associated systems" and applied to all aspects of the user's operations "including, of course, both batch and [Time Sharing Option]

TSO," he continued.

MSI avoids the locking out, or reserving, of an entire DASD volume, which is normally used to protect one data set while it is being updated, by allowing installation-specified classes of RESERVEs to be internally and transparently converted to MSI-type ENQUEUEs known to all associated systems.

MSI Basic, which does not include the RESERVE activity alternative, is available for \$10,000 or \$750/mo for the first CPU and half those costs again for each additional system.

The same pattern applies for the full MSI package. Thus, although its base cost is \$20,000 or \$1,500/mo, the effective cost for a two-system installation is \$30,000 or \$2,250/mo, the vendor said from 2902 14th St. N., Naples, Fla. 33940.

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CP-77 Extends Vortex II, Boosts Univac's V77 Mini

IRVINE, Calif. — A general-purpose multiterminal time-sharing system called CP-77 has been announced by Univac for use with its V77 series minicomputers. The software is said to be a compatible extension of the Vortex II operating system.

CP-77 operates with or without Vtam communication access facilities and provides a basis for operation of small to midsize multiterminal systems, according to a Univac spokesman.

The time-sharing system supports the entering and editing of program source code, the submission of job-streams to the background job queue and the execution and debugging of tasks directly from the terminal, the spokesman noted. In addition, CP-77 serves as a development system for programs designed to run under Univac's Pronto transaction processor.

Other facilities available to the CP-77 user include support for a "virtual printer"; program output and alphanumeric file contents can be directed by the terminal user to an output spooling device.

Developed by the Laboratory for Advanced Methods in Biological Data Acquisition at Brown University, CP-77 is said to maintain a unique terminal-oriented file system and to provide each user with four logical units which can be assigned to system peripherals.

The system provides the terminal user with the means to perform simple calculations as well as the ability to send simple messages to other user ter-

minals or to the system operator's console, the spokesman continued.

CP-77 maintains user identifications and passwords required for terminal access but also provides terminal users with the ability to access information about system status and the condition of background input queues, he said.

Distributed on 7- or 9-track magnetic tape, the time-sharing software will run on any Vortex II-configured V77 (or V70 with extended instruction set), 96K bytes of main memory, adequate disk space, a tape unit and teletype-writer-compatible terminals.

CP-77 costs \$1,500, according to Univac's Minicomputer Operations based here in Irvine, Calif.

'Bomp' Ready for PDP-11

SKOKIE, Ill. — Manufacturers are now exploding data up to 40 levels on Digital Equipment Corp. PDP-11s through the use of a bill-of-materials processor (Bomp), according to its vendor, J. Baker & Associates, Inc.

The package is a series of 40 Dibel programs that provide output reports ranging from item lists and a single-level bill of materials to an assembly cost buildup report and any of eight types of master file lists, a spokesman said.

Full stock status reports with reorder points and economical order quantities, manufacturing and assembly shortage lists and lists of purchase parts shortages with automatic generation of purchase orders,

as well as a top-level production schedule are also output, he said.

Reporting can be controlled on a detail, summary or exception basis. The full product cost reporting can be at any level such as component or operation, subassembly or manufacturing department. Variance analysis is available for current pricing, the spokesman added.

The system can handle multiple companies or locations. There is a "completely unrestricted" bill-of-materials definition, he added.

Running under either RSTS/E or CSC/300 on a CPU with as little as 48K main memory, Baker's Bomp costs \$8,800, Baker noted from 5135 W. Golf Road, Skokie, Ill. 60076.

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Scheduler Aids Retail Chain

(Continued from Page 23)

sheets to the scheduler, which then produces a complete detailed schedule for that night. If a job is not on the schedule, it is not run."

An "actual vs. schedule" report is produced to close the gap between what was planned and what was actually run. The system also enables people to see from the schedule sheets the jobs for which they are responsible. A job profile for the shift eliminates uncertainties and enables the person to focus on the work that lies ahead.

"Job profiles began changing after we used the scheduling system for a while," Granger concluded. "People found that, with this kind of knowledge, better utilization of capacity could be gained."

"As a result, jobs are now getting in and out faster. And we have the kind of long-range foresight that is critical for future resources planning."

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Patrick J. McGovern
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"User Expectations for Systems in the 1980's." Drawing on the attendee survey, this study will forecast user expectations in terms of product performance, software, communications and support.

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Vice President,
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"Plug-Compatible Systems: Alternatives in the 1980's." Can the plug-compatible survive and grow in the '80's? What new PCM strategies and products can be expected?

Victor D. Poor
Senior Vice President,
Research and
Development,
Datapoint Corporation



"Distributed Systems Architecture and Processors." Distributed functions, control, processing, databases: what are the present and future economic trade-offs?

Dr. J. Egil Juliussen
Senior Member,
Technical Staff,
Texas Instruments
Corporation



"Semi-Conductor Technology: Driving Force for Computer Systems." Can current computer architecture/designs effectively utilize 64K storage chips, bubbles, CCDs, fiber optic cables, etc.?

Richard L. Nolan
Chairman, Nolan,
Norton & Company



"Planning to Manage the New Systems Technology in the 1980's." Managing and adapting to fast-paced changes in technology and marketplaces; cost-benefits analysis and cost control.

Dr. Eugene I. Lowenthal
Vice President,
Advanced Product
Planning, MRI
Systems Corporation



"Database-Centered Architecture and Processors." The back-end file processor's impact on the user and vendor; strengths/weaknesses of the database-processor approach.

Asa W. Lanum
Director, Product
Software Development,
Amdahl Corporation



"User Opportunities to Improve Software Investment Pay-Off." Can new software be combined with old to produce more effective end-user operation? How does hardware enhance or stifle the potential?

C. Oakley Mertz
Vice President, Research,
International Data
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"The User Customer Base and Systems Migration Dynamics: Impact of Distributed Processing." IDC's migration study — how fast are users moving to newer systems, networks (SNA/SDLC) and distributed processing? What is the likely impact on computer usage in the 1980's?

James E. Thornton
President, Network
Systems Corporation



"New Alternatives in Systems Architecture." Will conversion/migration between non-compatible systems be easier by 1982/83? More or less costly? And what innovative architecture choices are open to users now?

James McGuire
President, Computer
Division, National CSS



"Computer Services, User Hardware Hybrid Systems." Why are the service companies now supplying their own hardware? What's next?

Dr. James W. Jewett
Vanderbilt University,
and President, Telco
Research Group



"Communications Systems—Optimizing 1980 Alternatives." How can users select from new carrier offerings in the packet and satellite areas? What compromises and trade-offs are needed with existing communication network investment?

Additional speakers to be announced.

'Arsap' Checks PDP-11s

HYATTSVILLE, Md. — Installations running Digital Equipment Corp. PDP-11s under RSX-11M can monitor system usage, measure system performance and bill for resources used with Arsap, the RSX-11M system accounting and chargeback system from Gejac, Inc., according to a spokesman.

Arsap logs statistics that reflect the resources consumed by individual users of the system. Data collected includes terminal connect time, number of log-ons and log-offs, disk storage utilization, number of I/O requests, CPU execution time and memory demand, the spokesman said.

The statistics are periodically presented to the user in a series of re-

ports.

These reports include both a summary of resources used and a detailed listing of resources consumed by each user, a terminal connect time profile in histogram format and detailed reports at the user's terminals at the end of each session showing the resources used.

Chargeback reports produced by Arsap include a financial summary which shows the accumulated charges and documents the billing rates and algorithm. In addition, numbered user invoices, sorted by user name, show both use and cost information, the spokesman said.

The package costs \$1,995 and can be ordered from Gejac at 3322 Stanford St., Hyattsville, Md. 20783.

'SAS,' 'Tell-A-Graf' Tie Adds Graphics to Analysis

WASHINGTON, D.C. — By interfacing two commercially available packages, technicians at Applied Urbanetics, Inc. (AUI) have made camera-ready graphics available as a by-product of statistical analysis operations on IBM 360, 370 and compatible systems.

A spokesman at AUI explained that although the users there liked the facilities of the Statistical Analysis System (SAS) from the SAS Institute — especially its data base management capabilities — they also wanted high-quality graphics to include in their litigation and policy research projects.

To meet that need, the authors of SAS developed an interface between

their package and Tell-A-Graf, available from Issco.

Tell-A-Graf is a graphics software system that allows users to make high-quality charts and other graphs on "any computer graphics hardware" using English language commands, the AUI spokesman explained. Without SAS, however, Tell-A-Graf was limited because it had no inherent data management or statistics capabilities, he contended.

The linkage, now available from AUI, allows analysts to perform statistical analyses of their data and then produce charts to highlight their conclusions.

The SAS/Tell-A-Graf combination has been used to drive large drum plotters such as those produced by California Computer Products, Inc. and Zeta, Inc.; flatbed plotters produced by Hewlett-Packard Co. and Tektronix, Inc.; and CRT units such as those from Chromatix to have "soft-copy" color displays, he said.

The combination software (SAS, Tell-A-Graf and linkage) is available for \$23,000 from AUI, 1701 K St. N.W., Washington, D.C. 20006.

'Sysmon' Update Aids MVS Usage

INDIANAPOLIS — Half a dozen enhancements have been built into Version 2 of Sysmon IV, making the update an even more powerful on-line systems monitor for IBM OS/MVS shops than the original package, according to the vendor, Performance Systems.

Sysmon IV is said to support uni-processor, multiprocessor and attached processor configurations without any system modification through the use of "simplistic" control parameters for the performance displays. The package is RMF-compatible and supports both Time Sharing Option (TSO) operations and the system operator's console, a spokesman claimed.

The displays include such things as processor and channel utilization percentages; demand paging, page faults, total system paging and swapping; unreferenced page interval counts; length of queues for I/O devices; and performance group and domain service levels and transaction rates, he continued.

Version 2 includes exception reporting on direct access and tape devices. These pinpoint enqueue bottlenecks, reserve lockouts, mounts pending and device drop ready.

An address space summary for TSO, batch, mounted and started tasks is a feature of Version 2, as is a report that shows specific system loading reportable to TSO, IMS, CICS, on-line and a range of other applications selected by the user as critical to his operation.

A display of start/stop times to allow multiple CPU coordination also shows selected time interval reporting, he said.

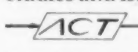
Version 2 costs \$289/quarter year per CPU, with a 50% surcharge for each additional CPU at the same site. Performance Systems can be reached through P.O. Box 44143, Indianapolis, Ind. 46204.

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Bollinger Claims Blasted As Nearly Irresponsible

By Stephen L. Robinson
Special to CW

The comments by Norman Bollinger ["Shop Can Save by Writing Its Own Data Base Package (CW, Sept. 25)] border on the irresponsible. Bollinger not only advocates building one's own data base package, he states it is cheaper than purchasing a vendor's product, implies the whole process is quite simple and claims the result will be "superior to the vendor's."

Presumably the acquisition of Bollinger's \$35 guide makes the process still simpler and the result even more superior.

Let's address the issues one at a time; first, consider the matter of cost. Bollinger has badly misinterpreted a true statement about commercially produced software — that 15% of a package's cost goes for development and maintenance, 85% for marketing and support.

This is true, but *not* for the first copy sold, nor the 10th, nor the 20th. Rather it is true after the package has "turned the corner" financially. That is, after sales of \$1 million, a development cost of \$200,000 would be balanced by marketing costs of \$800,000.

Development Cost

The cost of developing a *good* data base package is not "far less than \$20,000" as Bollinger stated, but considerably closer to \$500,000. A stripped-down system with very little capability will likely require at least two man-years of effort, not to mention the requisite computer time.

Such a stripped-down system would probably not have such properties as multithreading, extensive security provisions, generalized interfaces to facilitate access by query languages and report writers or data base administration tools. It would also probably lack

Data Base Corner

reliable backup and recovery procedures which synchronize recovery with multiple batch and on-line users.

The list could be extended, but I believe the point has been made.

What Does One Get?

This leads us to the second area of contention; namely, what does one get for "far less than \$20,000"?

It should be noted that \$20,000 probably pays for about four months of a good system programmer's time (assume a good person earns a salary of \$30,000, benefits, overhead and so forth add up to an equivalent sum). This does not include any computer time, although perhaps by following Bollinger's guide, we can write error-free code the first time through.

It is suggested we should get program-independent data. To me this implies some form of subschema or user view facility.

Bollinger proposes to do this by loading the code and the data definitions at runtime. Fine, but the code to handle true user views is quite tricky, and the necessary mechanisms to prevent resource interlock are even more difficult.

If all that is being proposed is a simple mask for records, it can be done without too much trouble, but the end product is hardly anything to write home about.

Next we have Bollinger's second component, I/O. No argument here, except if one wants to consider the relative inefficiency of Cobol I/O. However, since the whole package is to be written in Cobol, it would seem that efficiency is clearly not a concern here.

Funniest of All

Finally we come to the most hilarious of observations, file and record relationships: "This is a logical problem which, if well-defined, will be easy to handle."

I don't care whether Bollinger elects
(Continued on Page 30)

Freight Bill-Paying Service Adds Support in Midwest

LEXINGTON, Mass. — The Freight Audit Computerized Traffic Statistics (Facts) service, already available to shippers through Traffic Data Systems, Inc. (TDS) here and in Pasadena, Calif., is now being offered by TDS-Midwest, Inc. in Oak Brook, Ill. as well, according to a TDS spokesman.

Under Facts, TDS can either pay a shipper's bills or monitor the bills as they are paid by the shipper's bank. In either case, the bills are sent to the TDS office, where they are put through a detailed manual audit against the carrier's filed tariffs, the spokesman said.

This audit may pinpoint over- or undercharges, duplicate billings or other errors that a completely automated review could overlook, he said. After the audit, the bills are keyed into TDS' mainframe — a Honeywell, Inc. 60/62 — for processing.

The processing produces edit lists and generates management reports in addition to checks to the carriers if the

client has contracted for the payment option.

The reports provide analyses of the company's overall shipping patterns, the spokesman noted.

Facts reports trends on such key items as vendor, customer, carrier, product line, transportation mode and frequency of movement.

The manual audits and the data entry are done in the local TDS offices, after which the magnetic tapes are shipped here for processing. This provides both personal contact and the economies of centralized DP, the spokesman said.

Basic Facts service — bill auditing, five basic reports and payments if desired — costs approximately 60 cent/-bill submitted, and the company suggests that shippers with 500 to 1,000 bills a month are large enough to benefit from the service.

The corporation is headquartered at 1050 Waltham St., Lexington, Mass. 02173.

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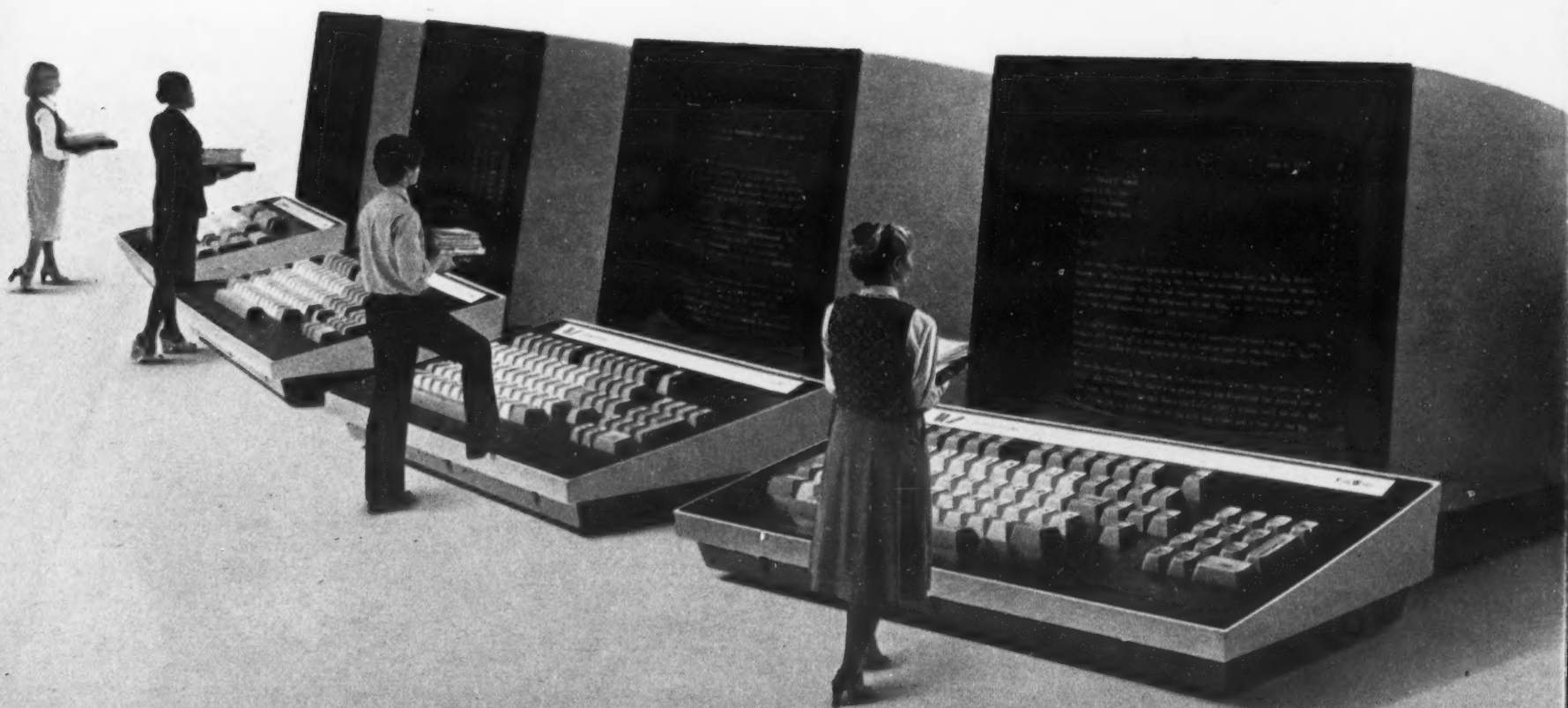
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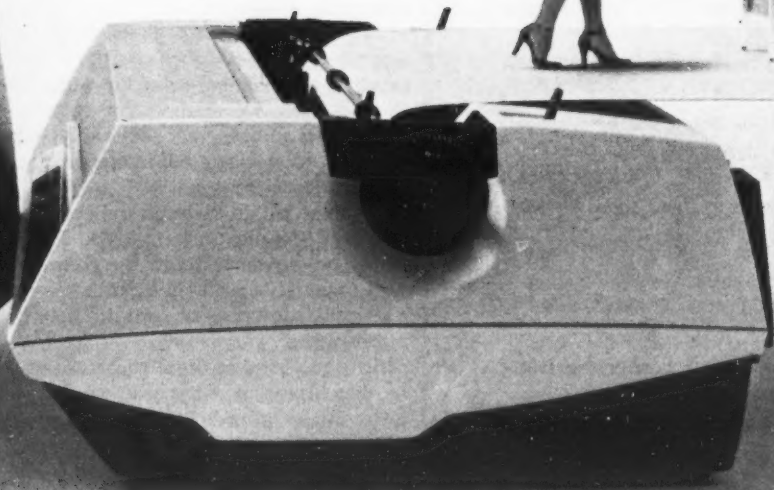
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Structured Forum Hits Road

NEW YORK — The Structured Forum, a one-day review of various structured design and development methodologies, begins an 18-city tour with sessions this week in New York, Boston, Toronto and Detroit.

The New York meeting is tomorrow and stops in the other cities will follow as the week progresses, according to a spokesman for co-sponsors Structured Methods, Inc. and Edutronics/McGraw-Hill.

Subjects to be covered at each stop will include the Warnier/Orr methodology for the construction of logical programs, the Jackson design methodology, Constantine/Myers/Yourdon concepts, basics of data base design and human resource development in a DP environment,

the spokesman added.

Chicago, Minneapolis, Seattle, San Francisco and Los Angeles are on the schedule for Dec. 4-8, while Denver, Kansas City, Dallas, Houston and St. Louis make up the itinerary for the week after that.

Early in the week before Christmas, the forum will be presented in Atlanta; Columbus, Ohio; Washington, D.C.; and Philadelphia.

Individual registration is \$175, but group discounts are available. All attendees will receive a \$100 credit toward services from Structured Methods or Edutronics or books from McGraw-Hill.

More information is available from Structured Methods, 133 E. 58th St., New York, N.Y. 10022.

'BDRaid' Backs IMS, CICS; Includes Three Programs

NEW YORK — BDRaid, an IMS utility package from BDR, Inc., consists of three basic programs: the Data Base Access Facility (DBAF), a Logical/Compare Utility (LCP) and an unload-reload utility (DBRfresh).

DBAF is described as a generalized utility which provides access to IBM's IMS and CICS data bases and segments. Through a command language, data base segments can be printed and modified as required, a spokesman said.

The use of external tables to drive DBAF eliminates the need for changes in the program each time a different structure is encountered or when changes are made to the data base de-

sign, he explained.

LCP is a Cobol program with an internal sort that sequences and compares data sets created by DBAF. By processing DBAF against data bases before and after executing an updating program, two data sets are created containing "before" and "after" images of the data base.

DBRfresh is an on-line IMS program that will, under control of an IMS message, refresh and save any or all data bases being used in an on-line test environment. Once BDRfresh is invoked, it will perform the desired task and send the operator a "ready" message when the refresh or save operation has been completed, the spokesman added.

The package is available now for \$18,500 from BDR at 17 E. 45th St., New York, N.Y. 10017.

Bollinger Claims Blasted as Wrong

(Continued from Page 26)

to employ pointers embedded in records or pointers in external tables, there is nothing simple about creating such facilities.

Bollinger has omitted from his list of components the utilities and amenities which typically accompany commercially available data base packages — for instance, high-speed loaders, high-volume update facilities, dump routines and statistic routines. He also omitted the need to maintain the software, enhance it and adapt it to new operating systems and I/O gear.

If He Leaves?

We might also mention the problem of what an organization does when the single person who understands the system (for \$20,000 this is presumably a one-man effort) decides to leave or gets hit by a truck.

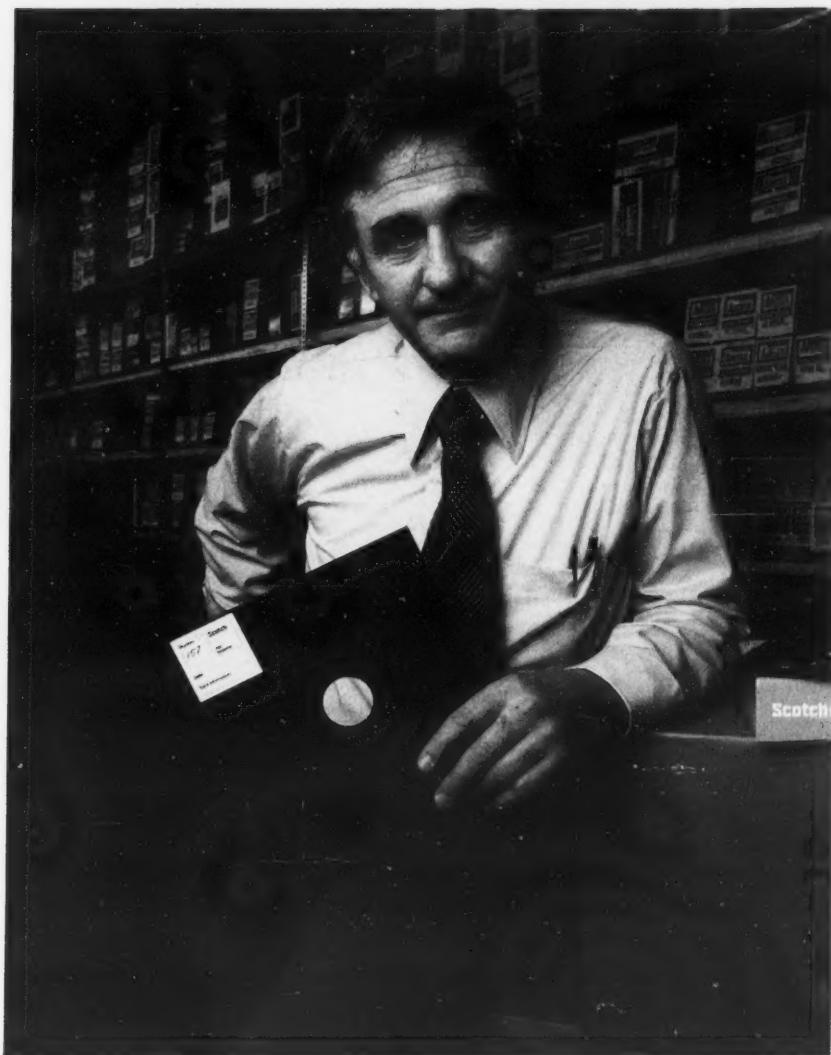
Finally the reader is directed to an excerpt from a Datapro Research Corp. report which appeared in the same issue of CW. An analysis of requirements and an objective cost analysis is unlikely to indicate an in-house data base project is reasonable.

However, do go through the exercise. You may just recognize that you do not need the power offered by commercially available packages. In that case, a stripped-down set of routines may be appropriate.

But don't expect them to be cheaper to develop than what you could acquire in the marketplace.

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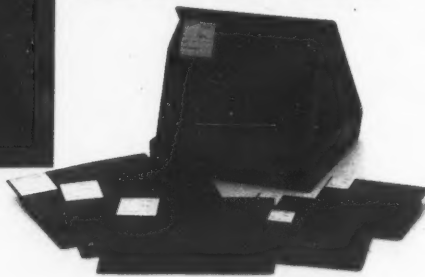
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CPE Effort Eases Manufacturer's DP Functions

Special to CW

SOUTH BEND, Ind. — Guessing at problems and developing possible solutions may be challenging, but being able to clearly identify problems and solutions can make life a lot easier. At least that's what Ron Gallagher, corporate manager of resource planning and technical consulting for the Bendix Corp., has found during his 11 years with the company.

Bendix operates two large regional data centers, two secondary centers and 18 stand-alone systems across the U.S. The two regional centers are located here in South Bend and in Ann Arbor, Mich., while the secondary centers are located in Sidney, N.Y., and Teterboro, N.J.

In Ann Arbor, Bendix operates a 2-byte IBM 370/155 with a Dynamic Address Translation (DAT) box to provide its users with virtual storage capabilities. Here in South Bend, the firm operates a 4-byte IBM 370/158.

"The corporation's hardware resources represent a wide array of mainframe systems and peripheral subsystems covering most of the major equipment suppliers," Gallagher said. "Since these sites do so much vital work for the organization, it's important that we understand the performance characteristics of these systems so their maximum processing potential can be realized."

Hardware Monitor Difficult

To ensure Bendix receives this maximum return from its systems, the company began doing computer performance evaluation (CPE) more than seven years ago. "At that time we had a corporate software manager interested in CPE," Gallagher recalled, "but he was interested only in terms of using a hardware monitor, so that was what we initially purchased."

But Gallagher and his staff soon found the benefits derived from measurements made with the hardware monitor did not come as easy as he would have liked: "It gives very accurate information, but it's difficult and time-consuming to install. In addition, it takes much longer to verify and analyze the data than we would like. So we were willing to give up 1% or 2% of accuracy for a tool which was more easily usable by a nonhardware technician."

"We still use the hardware monitor occasionally," he continued, "but with our limited staff, the software monitor is the better choice."

When they researched the monitors available and the areas in which they planned to use them, Gallagher and his staff eventually decided to purchase the Configuration Utilization Evaluator/Data Set Optimizer (CUE/DSO) from Boole & Babbage, Inc.

Only the South Bend site has a permanently assigned full-time individual responsible for CPE. At the two other sites which have these products installed, systems programming and operations personnel handle the monitoring and evaluation tasks.

Summaries for Meetings

Emery Johnson, senior project leader at the South Bend site, runs CUE to constantly monitor such areas as the CPU, channel utilization and paging rates. DSO is run only on demand, when problems in disk data set placement are suspected.

The CUE reports are produced with shift summaries so that at daily production meetings, Johnson can discuss bottlenecks which have occurred in the

system and how the resources are being utilized. In addition, he runs the graphics portion of the product so he can see what normal usage is and when these statistics may be getting out of normal bounds.

"For example, when I look at the paging graphics, I can quickly see what our peak paging rates are, when rescheduling of production workloads might be necessary to reduce paging or when we're going to have to have extra memory to handle the increased real storage demands," he explained.

He also studies graphic reports on such areas as channel, tape and direct access utilization as well as other significant indicators.

"When we think it's advisable, we initiate DSO to study disk volumes

and head movements between data set pairs so we can reorganize our packs based on the generated reports. This allows us to reduce contention time and helps us improve the utilization of space on the disks," he said.

The only time the graphic reports go beyond the data center management, Johnson noted, is when upgrades are required. By using the reports, Bendix can forecast when additional hardware will be needed and document its justification.

CUE/DSO also helps his organization string out its upgrading requests by reducing bottlenecks and balancing the workload, Gallagher added.

To illustrate this point, he cited a problem which presently exists at an-

(Continued on Page 32)

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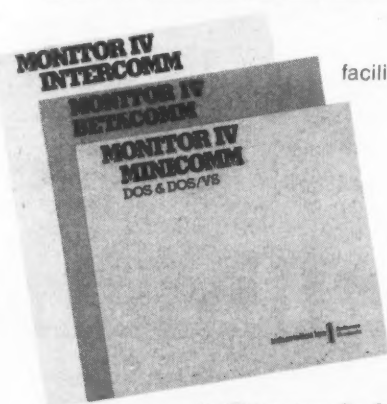
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3M Enhances Series 4000

ST. PAUL, Minn. — The Parallel Print/Extract (PP/E) program from 3M Co. is said to provide users of the company's Series 4000 Information Processor with "extensive" extraction options for list management. Multiple extracts can be performed, for example, with their output combined into a single list, a spokeswoman noted.

The Series 4000 is a minicomputer-based word processing system that can be used under software control to edit text, write letters, print labels or envelopes or prepare other forms. It reportedly has capabilities for global search and replacement, heading, footings and page numbering.

PP/E permits selection on five

operator-defined positions on a CRT screen, with each position containing as many as 62 variables. The operator can extract or select a specific variable or a range of variables on each position simultaneously, the 3M spokeswoman said.

The program permits extraction by first letter/first line, first letter/last name and Zip Code simultaneously with, or independently of, the defined selection indicators or screen positions.

Names and addresses meeting specified criteria can be counted, with the total displayed. Other advantages of the \$300 package include on-screen operator prompts, 3M said from Department LX8-32, P.O. Box 33600, St. Paul, Minn. 55133.

Users Can Work With Vsam Through 'Symdata' Update

NEW YORK — DOS- and DOS/VS-oriented Release 5.0 of the CA-Symdata test data generator from Computer Associates is said to support more file types than earlier versions, to include a user exit facility and to provide a selection capability that permits the tailoring of generated files.

Symdata is programming language-independent, eliminating the need to modify source programs in order to generate test data. Only three types of control commands are required to define the test file to be created, a spokesman said.

The first type of control identifies the characteristics of each field; the second, the characteristics of the record;

and the third, the characteristics of the file, he explained.

Release 5.0's extensions enable users to work with Isam and Vsam files in addition to various earlier file types. CA-Symdata will read an existing file in either of these newer formats and create a file that matches the input type.

In addition, users can now extract data from an Isam or Vsam file to build a subset, the spokesman said.

The user exit facility allows the user to write modifications to CA-Symdata which can process a file in unique ways at Open, Close, Read or Write times, he continued.

With the selection capability, records originating from the user's live data file may be processed selectively to create smaller test files.

The test files created by Symdata can be on magnetic tape, disk or punched card, the spokesman noted, adding that such flexibility makes the package "extremely valuable" as well as easy to use.

CA-Symdata runs under IBM DOS and OS (and the VS counterparts) as well as CMS. It costs \$4,800, he said from 655 Madison Ave., New York, N.Y. 10021.

CPE Effort Aids Manufacturer

(Continued from Page 31)

other Bendix site that doesn't yet have CUE/DSO installed. "They've been putting together their justification for the product, but as of right now, they are still operating without completely accurate statistical performance and workload data," he said.

"They've been having a capacity problem," he continued, "and we have theorized what the problem is, but unless there is some way of measuring the system, we can't prove where the bottleneck is and what system modification or hardware upgrade alternative is right for this situation."

More Memory?

This site is running at a high paging rate and the staff there feels that the answer is more memory. However, Gallagher noted that paging drops considerably in the evening.

"On the second and third shifts, where they don't have a high paging rate, added memory alone isn't going to solve this capacity problem," he observed. "I think what they need is a combination of more real storage and added processing power, but without the necessary statistic reports I'm only guessing."

Once this site has CUE/DSO, Gallagher feels it will be able to better optimize its existing system and develop the trends and facts it needs to justify tomorrow's system requirements.

"Once it begins daily monitoring of its workload," he concluded, "it will be able to prove to management that it is getting the most out of the existing system and providing a level of service consistent with the available resources. Then, when additional hardware is needed, the documentation and justification of the upgrade will be quite easy."

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To Run With 'Supercontroller' Nets to Offer Technology Mix, Doll Says

By Ronald A. Frank
CW Staff

NEWTON, Mass. — Networks are on the verge of offering users a mix of technologies to best meet specific applications needs, according to data communications consultant Dr. Dixon Doll.

Bell Canada has already taken steps toward integrated network offerings that combine various technologies in one service. Specifically, the Dataroute service now offers both integrated packet-switching and fast circuit switching, he noted.

Satellite facilities will be added to these integrated nets later, Doll predicted in a recent interview here.

Many users today feel that contention switches used with fast circuit-switched facilities are suited for certain applications and they will install these capabilities on their in-house networks if these facilities are not offered on public nets, he said.

Fast circuit switches such as Computer Transmission Corp.'s M3200 may introduce a longer time delay when the channel is being set up, but then this is the only technology that can provide the user with a predictable level of response time and capacity, he maintained.

Two Service Classes

Two general classes of service — two-ended and one-ended — will emerge on the integrated nets, Doll continued. Two-ended services identify both a receiving and a sending unit at the time the channel is established. Packet switching, such as the services provided by Telenet Communications Corp. and Tymnet, Inc., or fast circuit switching can be used. The response time going through the network with a fast circuit-switched facility will have more predictable delays not subject to intermediate stage queuing.

This type of channel is better suited for applications that have a predictable throughput, such as file transfers.

On the other hand, the packet-type facility is more suited to statistical or interactive uses involving varied levels of traffic.

Satellite Technology

Satellite technology can be used more extensively for broadcast-type services. Satellites are also well suited for bulk file transfers, Doll said.

The key point is that packet technology

may be only a partial answer to user network needs, according to the consultant.

From the carrier's point of view, there must be other technologies to provide varied transmission environments. An example of the one-ended facility would be a datagram-type service such as that proposed for Canada's Infoswitch network.

Here the user does not have to establish the destination location in order to input the message into the network. The user would sign onto the net and declare the type of transmission desired.

Infoswitch will provide three levels of service depending on the needs of the application.

Doll noted that such integrated services are growing in number. Even Bell has given some indications that integrated offerings

will eventually be part of the Advanced Communications Service, he said.

To use services involving several types of technology, the user will have to request the type of network transport technology desired when the network session is established.

At the same time, users will need the capability to go out to private network facilities as well as carrier services. These private nets would be in-house configurations based on Systems Network Architecture, Decnet and similar offerings.

'Supercontroller' to Emerge

To accommodate the varied network choices available to the user, there will emerge a "supercontroller that goes way beyond" (Continued on Page 34)

On-Line Net to Keep Records Straight for Canadian Hotels

By Ronald A. Frank
CW Staff

TORONTO — Keeping accurate records is important for hotel managers. A room unsold today is revenue lost forever.

Computerized back office information is vital for a hotel to operate efficiently. But when 24 locations with 28 properties are involved, an on-line network is the only way to keep things running smoothly.

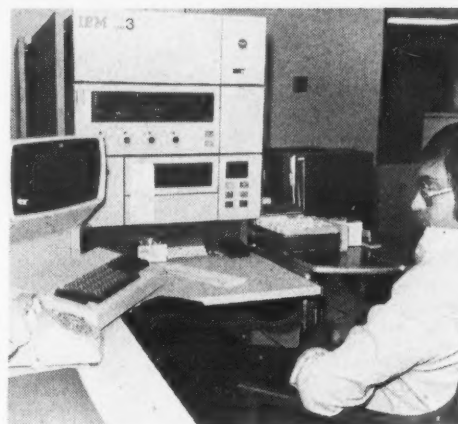
For Canadian Pacific (CP) Hotels, a data communications network is replacing various manual recordkeeping systems in order to optimize operations in its coast-to-coast chain.

The hub of the planned network will be in Toronto at the Royal York Hotel, which is one of the major facilities in the CP Hotel chain, according to Brian J. Hall, executive director of systems.

The company has installed dual IBM System/3 CPUs to handle back office operations including general ledger, cash control, accounts receivable and other functions that must be tracked on a real-time basis by hotel management.

Infocall Network

In order to connect its widely dispersed sites into a network, CP Hotels has decided to use the Infocall service from Canadian



CW Photo by R. Frank

Abdul Amarshi checks System/3 at CP Hotels' DP center.

National Canadian Pacific (CNCP) Telecommunications. The Infocall network will allow CP Hotels to get the benefits of packet technology without having to rewrite existing hardware and software routines, Hall explained.

The company installed dual System/3s early in 1977 and is now on the verge of automating its hotel sites by providing intelligent terminal workstations to its dispersed

(Continued on Page 36)

COMMUNICATIONS

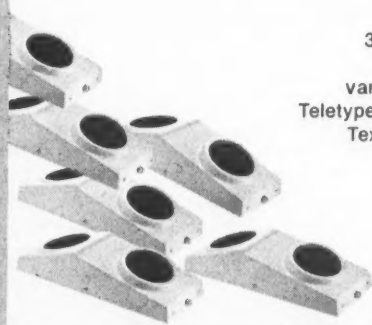
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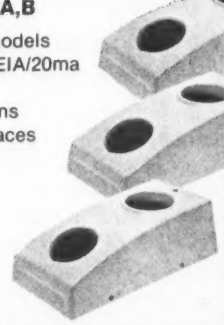


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Terminals Put Order at Control Division Site

OWATONNA, Minn. — To administer the specialty maintenance tool programs for large farm equipment manufacturers and their dealers, the Service Tools Division of the Owatonna Tool Co. processes more than 500 orders a week.

To help keep track of the orders for maintenance tools, the division uses a key-to-disk terminal system.

"The system is a real boon for us," operations manager Bill Ahrens said, "and it's a relief to the corporate DP department." Besides serving the DP needs of the company, the headquarters DP group also handled the division's daily orders and shipping orders plus maintained the customer files and updated the equipment listing of all the line items.

In December 1977, a number of factors, including an order entry rate that had doubled in three years, led Ahrens and systems analyst Mike O'Neill to abandon the division's keypunch system in favor of a Data 100 Corp. Keybatch system with three CRTs.

"For us," Ahrens commented, "it means that we are no longer subject to the occasional two or three day delays of the company's month-end closings, annual inventories or our own rush orders. We found that we were suddenly the masters of our own destinies. We could smooth the flow of paperwork, decrease the amount of errors and be more responsive to our users."

Now two operators key in order data via the terminal keyboards. Using specially designed programs — from order

and customer numbers to prices, taxes and discounts to transportation and order status — the Keybatch system guides the operators through the data entry process.

As the operators key in the data by entering a single-digit code number instead of a longer, descriptive phrase, the data is compared against tables in the system's five million-character disk storage device, ensuring it is within acceptable ranges prescribed by the system.

Because of the increased data entry speed, the operators now have more time to devote to other duties such as credit verification, obtaining new customer account numbers and updating the account record. Not only do the operators key in the order entry informa-

tion, they also maintain the customer files and enter daily shipping information.

Accountability for Accuracy

Along with increased performance, error rates have also decreased significantly, Ahrens noted. "It used to be demoralizing when the headquarters DP department gave us the error listings," Ahrens said. "It was assumed that if there was a mistake, we had made it. In many cases, that just wasn't so. Now the paper never leaves our offices — the operators have total accountability for the data and its accuracy."

Thus far, the operators have scored high marks, and error rates are consistently below 1%. One month the errors rose to 6-1/2% but a daily follow-up edit procedure immediately caught and identified the problem. Once the error was identified, it was a simple matter of the operator doing the "job out" procedure over again — simply and quickly with little effort and no loss of order entry information.

The greater productivity of the Data 100 terminal system has helped Ahrens create greater goodwill among customers and improve cash flow for the division, Ahrens said. "If a dealer has a tractor that needs repair, he doesn't care about our problems."

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Nets to Offer Technology Mix

(Continued from Page 33)

yond anything available today," according to Doll. On the user's side of this supercontroller there will be mainframes, minicomputers and PBXs, while on the network side there will be satellite facilities, SNA facilities and industry nets like Swift.

The supercontroller will be supplied by independent vendors like Collins and Northern Telecom. This new controller will be to the data user what the watboxes and Infoswitches have been to the voice user, he predicted.

The SL-1 digital PBX from Northern Telecom is an early example of the supercontroller since it has the same kind of technology. But even though it is an advanced device, the SL-1 does not yet have the multifunction capability the new breed of supercontrollers will have. "It is a digital switch and it has the flavor of what is coming," Doll said.

Contention Switch

The supercontroller will be a high-level contention switch that is not really protocol-sensitive. It will make the required physical connections to a specific network facility and then the individual protocol-sensitive modules in the various nets will be provided by those who interface to the networks.

The recently announced processor by CTX, Inc. that takes Binary Synchronous Communications devices and makes them compatible with an X.25 network is a step in the direction of the supercontroller, Doll said, although it is not yet the entire answer.

The basic technology needed for the supercontroller is already available, he noted, but what is needed is the "brave system integrator" who will mesh product capabilities now provided by many suppliers.



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Seminar Slated

NEW YORK — A seminar examining the correct user approach to implementing a DP/data communications strategy will be held by the Yankee Group Dec. 5-6 at the Harvard Club here.

Using a case study method, the two-day session will look at models of implementation, discuss "avoidable mistakes" and evaluate new technologies and their applications.

The presentations will cover such topics as building the applications, organizing the DP-data communications operation, planning and control and "internal marketing."

The seminar costs \$550. Further details are available from The Yankee Group, Box 43, Cambridge, Mass. 02138.

Network Keeps Records Straight

(Continued from Page 33)

locations. The workstation includes an Ontel OP/1 CRT with 10K bytes of random-access memory and programable read-only memory Prom storage that can emulate 3277 protocol functions, Hall said.

The System/3 CPU in Toronto will be able to poll the remote terminals which look like IBM CRTs operating with 3270 protocol.

Asked if there was any significance in CP Hotels' decision to use CNCP's network service, Hall said the Hotel group operates separately from the carrier. "We deal strictly at arm's length," he explained, adding that if there had been more cost-effective services elsewhere, he would have selected another solution.

To reinforce his point, Hall said IBM had suggested a net of 3275 terminals in a multidrop private-line configuration, but this would have been several times more expensive than the Infocall approach.

Printers for On-Line Access

The workstations are provided by CNCP as part of the network offering. The intelligent CRTs will include Centronics Data Computer Corp. 306C printers to give each hotel on-line access to the corporate DP center at the Royal York.

Each terminal will be used for both local 3270 operations and on-line transmissions. Specially designed front-end versions of the terminal will convert the 3270 output into 1,200 bit/sec

sec Ascii data for transmission to the System/3. According to Hall, the terminal workstation will cost \$375/mo with an additional \$80/mo for each terminal access, and this is more cost-effective than other solutions.

Although 1,200 bit/sec may seem like a low transmission rate for the terminals, Hall noted that the average time for the CPU to answer a remote site is "eight to nine seconds." In addition, the local mode printing capabilities is a feature that would not be available with IBM terminals.

Initially the system will be programmed for revenues, cost of sales and similar back office functions, according to Tom Adhoch, senior programming analyst, but later room reservations and other applications will be added.

The System/3 CPUs operate with IBM's Communications Control Program (CCP) to poll the remote terminals. The applications programs are being written in RPG-III, and the screen formats are being designed for simple use by relatively unskilled operators who typically will be working on the corporate controller's staff at each of the hotels.

Hall would much rather keep his four programmers busy with applications software development than worry about teleprocessing software. The Infocall service was attractive because it is transparent to all existing hardware and software procedures, he noted.

Possibilities for Future

The System/3s each have 512K bytes of storage of which 300K bytes will be devoted to the recordkeeping system now in its final stages of development.

Hall accepts the possibility that implementation of all planned applications could cause the DP center to outgrow the System/3s. CP Hotels has been looking at alternative CPUs, and the IBM System/38 may provide the necessary additional capability, but a final decision has not yet been made.

Before installing the present CPUs, CP Hotels was using time-sharing facilities at Computer Sciences of Canada.

As the on-line Infocall applications begin to operate on the net, increasing amounts of needed data will be available on a real-time basis, Hall said.



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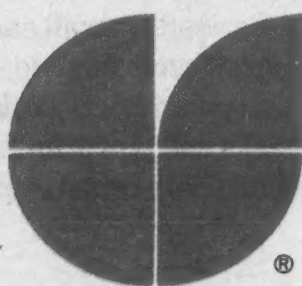
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John R. Cola, Director of Information Systems, Nissan Motor Corporation in U.S.A., Carson, California

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CUPERTINO, Calif. — Toll-free access to Tymnet, Inc.'s public packet communications network has been added in 13 cities, bringing to more than 150 the total number of local access locations. These are complemented by nationwide Wats coverage, the company said.

Tymnet has also added its 31st location with 1,200 bit/sec local terminal access support. Since April, the company has added 1,200 bit/sec access in 10 cities including Portland, Ore.; Louisville, Ky.; New Orleans; Seattle; El Segundo, Ca.; Phoenix; Darien, Ct.; Hartford, Ct.; Baton Rouge, La.; and Memphis, Tenn.

The latest local access locations in-

clude Nashville, Tenn.; Lexington, Ky.; Hayward, Ca.; Chattanooga, Tenn.; Charleston, S.C.; Knoxville, Tenn.; Jackson, Miss.; Greensboro, N.C.; Manchester, N.H.; Columbia, S.C.; Spokane, Wash.; Fresno, Ca.; Savannah, Ga.; and Plymouth, Mich.

Tymnet's international access also has expanded with the addition of Austria, Italy, Hong Kong and Singapore. Tymnet service now is available in 15 foreign countries through international record carriers and postal, telephone and telegraph authorities.

Approval for service from at least three other countries is expected before the end of 1978.

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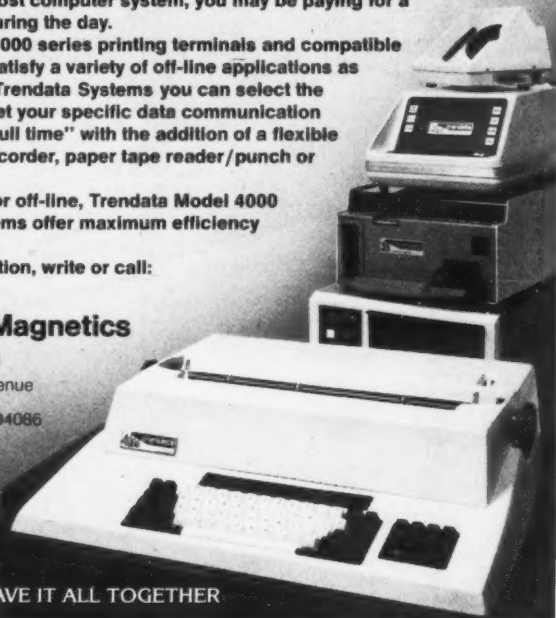
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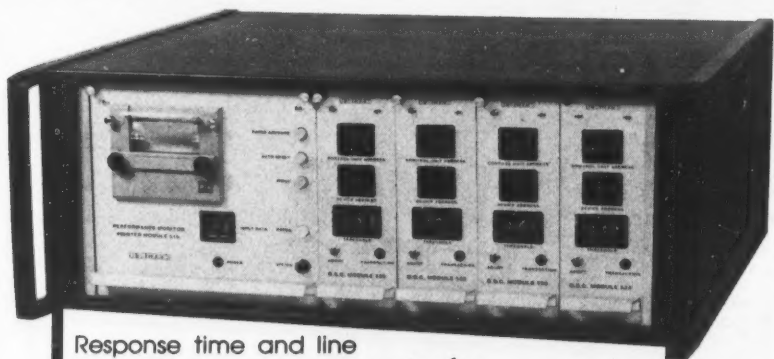
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Emulators Tie Harris 8000 To Three Makers' CPUs

DALLAS — Enhanced communications emulators to interconnect Harris Corp. 8000 series intelligent terminals with most Honeywell, Inc., Univac and Burroughs Corp. mainframes have been announced by Harris' Data Communications Division.

Revised software releases of the Univac and Burroughs protocol emulators already have been field tested and put in use at customer sites, and additional revisions to all three emulators are scheduled for the next six to 12 months, the firm said.

The revisions in Harris' emulators will handle the hardware and software introduced in recent months by the mainframe manufacturers, a spokesman said. They reportedly include capabilities for queued transaction handling, local format storage, remote printers and random-access disks and diskettes.

Harris' 8770 terminal system now provides data entry and retrieval compatibility with Honeywell's 7760 diskette-based interactive terminal and with VIP 7700R/7705R terminals, which replaced the VIP 7700 series. The 8770 is supported by Honeywell 200/2000, 400, 600, 6000 and 60 series computers and front-end controllers under the MSR/2000, OS/2000 and

Gcos operating systems; the emulation will be available in June.

Harris' 8210 terminal system emulates Univac's Uniscope 100 and 200 terminals and the UTS 400. It is supported by Univac's 1100 and 9000 series mainframes and by Series 70 and 90 units tying into Univac, CTMC or DSC communications controllers.

Software compatibility is provided for the OS/3, OS/4, OS/500 and 1100/OS operating systems. The 8210 also is being used with the 1100 series with Exec8 and on 9000s with MCP and IMS; it will be available in January.

Harris' 8220 terminal system now emulates Burroughs' TD830 interactive terminal and the earlier TD800 and TD820 versions. It is supported by all Burroughs mainframes and front ends, including the B1700, B2500 and B4800 series and the B6700, 6800 and B7700, all under the MCP operating system and NDL communications.

The cost of the emulation features has been bundled with that of each terminal, the spokesman said, from the Data Communications Division, 16001 Dallas Parkway, Dallas, Texas 75240.

Dataroyal IPS Line Gets Unit Offering 150 Char./Sec

NASHUA, N.H. — Dataroyal, Inc. has introduced a higher speed addition to its IPS-7300 line of intelligent hard-copy terminals. Priced at \$4,675, the 150 char./sec IPS-7326 complements earlier units with 120 char./sec output rates, according to a spokesman.

The IPS-7326 combines a matrix printer with an 8-bit programmable microcomputer. A movable data input station consisting of a gas discharge display and Ascii keyboard is also standard on the system.

Its microcomputer architecture al-

lows the 7326 to be programmed to meet specific application requirements and then reprogrammed when those requirements change by plugging in programmable read-only memory (Prom) chips, the spokesman explained.

An IBM 2848-compatible serial interface is standard on the IPS-7326 and a 20mA current-loop interface, as well as other serial interface types, are available as options. The firm is at Main Dunstable Road, Nashua, N.H. 03060.

Service Eases Car Recalls

BEDMINSTER, N.J. — A Bell System national account group team working with Ford Motor Co. personnel has helped develop a nationwide communications service to help Ford and Lincoln-Mercury dealers determine the recall status of any Ford vehicle built since the 1968 model year.

The service is called the Computer-Assisted Recall System (Cares). A team of Long Liners working in Dearborn, Mich., with the Ford Parts and Service Division contributed a year and a half of effort to develop the system.

"Cares is one of several components to help Ford streamline its recall procedures," according to Robert Gross, Bell System national account manager.

The system ties a dealer into a system that can tell within seconds if a vehicle is subject to recall for either mechanical or emission problems.

To use the system, a dealer using a telephone with a Touch-Tone pad calls toll-free to an IBM 3033 mainframe and punches in a code identifying the

vehicle. The CPU then responds through a Peripherals T-Comm/7 audio response system with information about the vehicle's recall status.

The service is the result of a team effort in which the Bell account team helped Ford develop the prototype dealer worksheets and provided a technical assistance hotline for Ford parts and service personnel.

"In the past, consumers and dealers had to depend on mailed information. With this system, a dealer can answer a question about recall in a matter of seconds," Gross said.

The system is also a money-saver for Ford. "The system resulted in a \$250,000 savings over what time-shared computer alternatives would have cost. Because Ford owns the system, it will be possible to add customer and dealer services in the future with little or no problem," Gross said.

The service will be available to each of Ford's approximately 6,600 dealers. It will function Monday through Friday, from 6 a.m. to midnight.

Efficiency the Aim 'Networking' Has Many Meanings, One Goal

By Patrick K. Phillips
Special to CW

With the industry just beginning to dig out from one of the most massive promotional campaigns ever to accompany a single technological concept — distributed DP — users are again being barraged by a new term: "networking."

The term has alternately been used to describe a collection of systems, connected to each other and a host computer, connected to each other only or connected to a host computer only. Depending on the definition, the systems may either be cable- or communications-connected.

Whatever definition one chooses, however, the objective of networking is the same — to connect products in the most efficient manner possible to solve DP and communications problems.

In most cases this means remote systems not only need to be compatible with each other, but with mainframe manufacturers' systems as well. Users should not be expected to modify the software in the mainframe to accommodate differences in communications protocols for a variety of terminals on the primary (system-to-host) communications network.

Product Connection

Both a primary network and a secondary ring, or subnetwork, can exist within a network. On the primary ring (the first level removed from the mainframe), systems are interconnected via single lines from a mainframe to individual systems (point-to-point) or via multipoint lines from the mainframe to several systems.

The choice of protocols used in the primary network depends on a number of factors, including traffic and types of peripherals as well as host processor configuration requirements.

Looking beyond the primary network, a secondary network can be established in which second-level terminal systems communicate with primary terminal systems. Where the primary terminals are used to provide store-and-forward data to the mainframe, the secondary network terminals can be used to provide data entry or transaction-oriented activities for input to the primary terminal.

Systems should not only allow effective communications with the host processor via the primary communications network, but should also provide both batch and interactive communications in the secondary communications network.

Secondary Networks

Within the past 12 months the communications and processing capabilities of terminal systems on the primary communications network have grown more sophisticated. Today's terminals at the upper end of the capability spectrum include operating systems and multitasking capability — allowing concurrent high-level execution along with communications — as well as having the capability to support remote terminals which can be used for source data entry, program preparation, and other tasks.

A secondary network provides the means for remote workstations to be

attached to the primary terminal and run as if they were locally attached. Once the workstation is placed at a remote site, a need has been created to print reports at the remote location, thus creating a need to ship "batch" data to the secondary site.

Users should expect and are entitled to receive reliable communications between the primary terminal and the secondary or subsidiary terminal. This implies synchronous transmission with more sophisticated error-checking and retransmission capabilities than that provided under asynchronous discipline. Thus the primary terminal has become a minihost.

Three Benefits

As terminal systems have become more sophisticated and user needs for DP have grown, the pendulum has swung back from the strong central mainframe point of view. Some of the applications performed on the mainframe are off-loaded to terminal products at remote sites. This provides three beneficial effects for the user.

First, the mainframe is unburdened of some of the workload. Second, the network is freed of a few traffic requirements — particularly those of an interactive nature — thus saving substantial network communications cost. Third, the belief is returning that source data entry should be the responsibility of the local division.

The transmission of data to a central site for processing when results are needed back at the originating site is a waste of communications resources. The use of communications facilities for a simple DP function such as data entry or program preparation is likewise a waste of resource for the network owner.

The terminal network owner must constantly look for ways to reduce the communications and processing requirements. They go hand in hand and must be optimized together, not individually.

Because of technological advancements in software engineering, hardware and communications protocol, users can expect to see terminal systems and terminal-based networks continue to grow with the inclusion of additional functions. This can occur by expanding the terminals themselves into multiprocessor systems, connecting them by more and more sophisticated communication protocols.

Software, both vendor-supplied and user-written, will become more easily available with the advent of higher level languages, producing more reliable and sophisticated software products for terminal processors.

Smaller, lower-cost and more sophisticated hardware will in turn allow larger multi-processor terminal offerings. Functions which are now forced to fit into a single processor in a multiprocessor or multitasking mode — such as volume data entry (key-to-disk), source data entry and remote job entry — will migrate into separate processors in a multiprocessor system accessing a common data base.

This data base will be resident at a primary terminal node and will in turn be accessed by "remote remote" (or subsite) terminals. Users will request and pay for incremental functions by

connecting additional processors to the terminal network at appropriate locations.

More sophisticated communications protocols will allow interactive and batch access from both secondary and primary terminal sites to all important nodes in the network. Communications technology will improve and begin to minimize communications cost.

Because of hardware technology advance, this implies that in a large terminal network even the most simple terminal product at the farthest remote location will be able to perform such sophisticated tasks as compression, error checking and correction and en-

ryption.

Communications sophistication will allow terminals to become "logical units" rather than "physical units" in terminal product networks. Terminals will in a sense become remote peripherals to mainframes.


All the indicators are that the 1980s will bring a dramatic increase in network size, in the number of terminals installed at the far-flung reaches of user locations and in the variety of richness of functions and applications provided on those terminal offerings.

Phillips is director of product planning at Data 100 Corp., Minnetonka, Minn.

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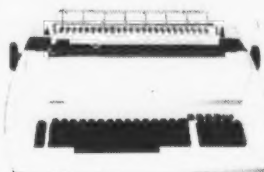
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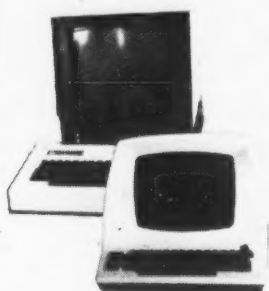


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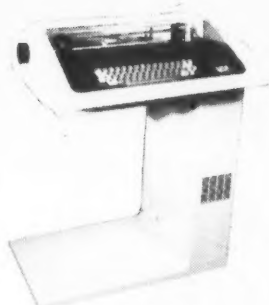


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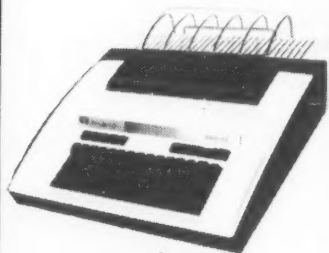


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Sweda Offers Restaurant ECRs

PINE BROOK, N.J. — Sweda International, a division of Litton Industries, has introduced two electronic cash registers (ECR) — the 4610 for lounges, taverns and smaller restaurants and the 4620 for larger fine-

dining establishments.

The microprocessor-based ECRs were designed for heavy use in demanding environments and reportedly offer high flexibility in application, selection and management control.

Terminal Queries Clients For On-the-Spot Surveys

COSTA MESA, Calif. — MSI Data Corp. has introduced a data entry terminal that reportedly offers quick customer feedback. The unit, called Tellus, was designed to monitor consumer attitudes on-the-spot in such places as hotels, supermarkets and hardware stores.

The "push-button questionnaire" will offer another option to companies seeking customer feedback, an MSI

spokesman said. Methods such as personal interviews, telephone canvassing, comment cards, mail surveys, market share studies and financial indexes can be prohibitively expensive, too slow to provide timely remedial efforts or often elicit too small a response.

With Tellus, a customer can answer a set of 11 questions in 30 seconds, and the unit "doesn't intimidate customers or provoke a confrontation," the spokesman added.

The initial marketing effort for Tellus will be in the lodging industry, with possible future use in restaurants, department stores, financial institutions, airlines, car rental agencies and market research organizations.

Questions to be asked and the customer's available responses are specified by the purchaser and can be changed at any time.

The terminal is a self-contained unit that can be used in any high-traffic area, MSF said.

Data can be displayed on the unit itself or on a series of preprogrammed reports printed on an optional 12-column printer.

Another option permits a user to collect and store information for later transmission to a CPU for statistical analysis.

Costs range from \$1,500 for the basic Tellus unit to a maximum of \$3,000 with options. First deliveries are scheduled for next spring.

MSI Data Corp. is at 1381 Fischer Ave., Costa Mesa, Calif. 92627.

In bar and lounge applications, the Model 4610 offers 25 preset departments and simultaneous operation by two clerks, with the printing of separate media totals through "B" keys. This feature may be tied into an optional second cash drawer.

In fine-dining applications, the Model 4620 offers 100 preset departments through Sweda's "paging" keyboard — by turning a page on the keyboard, the operator can change departments (menu items), which saves valuable keyboard space, a spokesman said.

Model 4620 options include an additional 100 departments and precheck control for up to 16 servers, with individual server sales totals, that allows the 4620 to be used as a precheck unit or both.

Members of the L-45 series, both machines offer 170 price lookups; previous balance and service; the calculation of two different taxes automatically and another tax manually; calculation of waiters' and waitresses' tip totals; production of 10 department reports, in which each department can report to three different groups at one time and, through an optional check number control system, the tracking of up to 128 checks at one time, with a report on outstanding checks.

Standard features of both the 4610 and 4620 include descriptors of up to six alpha characters; nine tenders, for cash, check and seven charge cards or miscellaneous tenders; an alphanumeric operator display; an illuminated keyboard; a real-time clock; programable check endorsement; a "journal low" indicator; true-customer count capability; and programable chit printing for departments and/or tips.

An auxiliary battery to provide backup power is offered as an option on both registers.

Prices start at \$2,795 for the 4610 and at \$2,995 for the 4620. First deliveries are scheduled for February from Sweda at 34 Maple Ave., Pine Brook, N.J. 07058.

TAC Unit Compatible With IBM System/7

ATLANTA — Technical Analysis Corp.'s (TAC) Label/300 1C/S7 is said to emulate the addressing and message sequences of the Dataroyal, Inc. IPS-7 using a communications protocol compatible with the IBM System/7 as it is defined for remote peripherals (IBM 2848, 2260 and 1053).

The Label/300 can be used as a replacement or alongside the Dataroyal without any changes in system software or in communications hardware.

The product retains all the special printing features of the Label/300, uses an RS-232 interface and supplies all signals necessary for operation with a Bell 202C or similar modem.

The Label/300 is available for \$8,500 from TAC at 120 W. Wieuca Road N.E., Atlanta, Ga. 30342.

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AUSTIN, Texas — How can you pare salary levels and, at the same time, increase employees' take-home pay, boost productivity and reduce turnover? City National Bank, with assets of \$390 million, has found a way to accomplish all this, while still keeping employees happy.

After changing some equipment and re-vamping structures as a result of those changes, the bank has increased its volume of business, decreased its error rate and made performance evaluation and administration easier.

In addition, the bank feels it is attracting more motivated, more productive employees, while discouraging the less competent ones. "Our production/pay system attracts good operators and discourages poor ones. Our guaranteed hourly rate is set relatively low, and unless an operator is good enough to earn production pay, all he makes is that guaranteed hourly rate," according to Ken Johnson, marketing services representative for the bank.

"The way our system is structured, good operators can earn a lot of production pay and enjoy high hourly rates. Now I believe

we have the fairest salary plan possible," he said.

The bank was able to carry through this plan by replacing its card-handling equipment — keypunches and key verifiers — with a key-to-disk data entry system.

Other measurable effects of the change were an increase of roughly 34% in data entry production and an associated cost reduc-

tion.

Johnson said the bank had two broad objectives when it first installed its key-to-disk system. "We wanted major improvements in the quality of our work for our own bank and the services we sell to other banks. In addition, we needed more control of our production," he noted.

(Continued on Page 48)

System Axes Time Involved In Processing Union Benefits

UTICA, N.Y. — At least one union here is not worried about automation and has in fact turned to computers in order to serve its membership better.

"Computers are basic business tools that pay off in efficiency and cost savings. They are neither frivolous nor a luxury," according to Joseph C. Talarico, president of Amalgamated Meat Cutters, Butcher Workmen and Affiliated Crafts of North America, District Union Local No. 1 here.

Talarico says that all of Local 1's computer programs are keyed to the goal of making the union more responsive to its members.

Twenty-three Honeywell, Inc. 7760 CRT terminals are on-line to a Honeywell Level 64 computer at the union headquarters pri-

marily to permit fast information retrieval.

But more important than the speed provided by the system, Talarico said, is the fact that all the information regarding a union member's benefits status is current and accurate.

Talarico sees Meat Cutters Union Local 1 as a trend-setter. "As far as we know, we are the only union our size that has totally computerized its operation in-house," he said. "We're able to offer a full range of progressive services to our members only because of our efficient computer system."

Talarico credited Local 1's DP manager, Mark S. Stone, with originating and developing the complex, efficient array of pro-

(Continued on Page 44)

CW Needs Your Output

Getting useful information into the hands — or eyes, or ears — of users efficiently will always be one of the major goals of DP. Since output is often one of the slowest aspects of DP operations, it is among the most challenging, important problems users face. If you have met this challenge, here's your chance to tell other *Computerworld* readers how you did it.

"Computer Output Equipment" will be the theme of a special report to appear in the Feb. 26 issue of CW.

We want to hear from you. Are you using plotters or graphics in your operation? How about voice-output, microfilm or color graphics CRTs? Have you found a better output method?

Contributors should send us about four typewritten, doublespaced pages describing the problems they faced, how they handled them and what results they got. Articles or questions concerning them should be addressed to Howard A. Kerten, Computerworld, 797 Washington St., Newton, Mass. 02160 (617-965-5800). All material must be received by Jan. 10.



VA Opens DP Center

Max Cleland (in wheelchair), administrator of veterans affairs, and W.R. Martin (right), assistant administrator for data management and telecommunications of the Veterans Administration (VA), inspect the computer room of the VA's new Hines DP Center in Maywood, Ill.



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SYSTEMS & PERIPHERALS

Union Axes Time-Consuming Processing

(Continued from Page 43)
grams used to solve management problems as well as to serve the 14,000 union members.

Talarico initiated Local 1's credit union five years ago when he was vice-president. That was before the computer. "It took us weeks to prepare quarterly reports for 1,000 members," he said.

Membership Boom

But with Stone's arrival in 1975 and the union's initial lease of the Level 64, membership grew rapidly. In the last five years, Local 1 has had the fastest growth rate of any credit union in the Northeast — and one of the fastest in the country, Talarico said. Today, nearly half of Local 1's 14,000 members belong to its credit union.

"Because of the efficiency of our computer operation, we can compete with all the local banks serving our members, who are spread out in 47 counties in three states," Talarico said. Checks go out the same day as share withdrawal requests are phoned in, and loan checks are mailed the same day the application arrives in Utica. "We've been able to offer new-car loans at 8% when banks were getting 10% to 11%, and used car loans at 9% when banks get 18%," he said.

Up-to-date quarterly reports are now generated on the Level 64 in a few hours. Year-end statements were in the mail to 7,000 members by Jan. 4, Talarico noted.

Money Refunded

Another benefit Local 1 offers its union members is reimbursement for prescription drugs. When the union went "self-insured" — rather than having an insurance company underwrite the program — Stone designed the claim form so that it serves also as a keying document. All information that needs to be keypunched is shaded on the form. "It makes the job fast and easy for our keypunch operations," he said.

Safeguards were built into the computerized drug-check issuing procedure to ensure that a check cannot be written for a fraudulent claim.

Another member benefit,

which Talarico calls a "first in our industry and one of the first in the country on this scale," is a prepaid legal plan. Totally self-funded through employer contributions, the plan allows members a specified number of hours of free legal counsel for wills, house purchases, estate planning and so forth.

"The secret is running the union like a business. I'm responsible for management of

our dues-payers' money," he said. "I use the computer to provide member services and to provide myself with information I need to make intelligent management decisions."

Apparently he does it very well. Local 1 has been rated in the top .5% in the country in terms of investment performance.

President Talarico called Stone to his office one day and said, "I'm thinking of offering

a maternity benefit program for part-time employees. What is our potential liability?" In four hours, Stone had the report on Talarico's desk.

Stone has a penchant for neatness. His keypunch cards are color-coded to avoid possible confusion. For example, cash cards have a blue stripe on the edge, claims processing have green, and credit union checks are red-coded. Batch cards and job cards are coded

with the same color.

His documentation is neatly organized in three indexed volumes. Complex checks and audit controls are built into each program. His rerun rate? "About 10 a year," he said.

Local 1 owns its Level 64 with 256K bytes of main memory, three MSU 4000 disk drives, 23 7760 CRTs, four tape processors, a 1,200 line/min printer and a 1,050 card/min card reader.

The Bantam. The cocky new \$599* CRT that just changed the pecking order.

User Need	Feature	P-E BANTAM	LSI ADM-3A	Hazel- time 1400	Hazel- time 1500	Adds Regent 100
Easy to read display	7 x 10 matrix for highly legible characters	Yes	No	No	Yes	No
	Black on white or white on black display	Yes	No	No	Yes	Yes
	Display set deep in hood to reduce glare	Yes	No	No	No	No
	Full 24 x 80 display	Yes	Yes	Yes	Yes	Yes
	Full upper and lower case	Yes	Option	No	Yes	Yes
	Non-glare screen	Option	Yes	No	Yes	Yes
High operator throughput, low operator fatigue	Tab stops/tab key	Yes	No	No	Yes	Yes
	Backspace key	Yes	No	No	Yes	Yes
	Repeat key	Yes	Yes	No	No	Yes
	Shiftlock key	Yes	No	No	No	No
	Separate print key	Yes	No	No	No	Yes
Convenient switching Local/on-line	Local — remote key	Yes	No	Option	Option	Yes
International Character sets	French/German/Swedish/Danish/British/Spanish	Option	Option	No	Option	Option
High speed numeric	Integrated numeric pad	Yes	Option	No	Yes	Yes
Convenient system interfacing	RS-232/CCITT-V24	Yes	Yes	Yes	Yes	Yes
	Current loop	Option	Yes	No	Yes	Yes
Simplified program debugging	Transparent mode and displayable control characters	Yes	No	No	No	No
Faster maintenance	Self-test	Yes	No	Yes	No	Yes
Minimum desk space	Small size	15Wx 19Dx 14H	15.5Wx 20.2Dx 13.5H	15.5Wx 20.5Dx 13.5H	15.5Wx 20.5Dx 13.5H	21Wx 23Dx 14.5H
Printer port	Printer port	Option	Yes	No	Yes	Option
Cost effectiveness	Qty. 100 OEM price	\$599†	\$740	Less than \$550 in quantity 1000	\$860	\$895

*In quantities of 100.

†Qty. 1, End User Price \$966.

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Imaging Meet Planned

BOSTON — The Institute for Graphic Communication, Inc. will present a conference on "Imaging Industries Over the Next Decade: Trends, Opportunities, Threats and Forecasts" on Dec. 3-5 at the Andover Inn in Andover, Mass.

The conference will discuss digital hard-copy printers, extended reprographic systems, multifunction terminals and automated prepress systems, a spokesman said.

Sessions will include such topics as "Impact of Major Trends on the Next Decade of Imaging," "Electronic Threat to Conventional Photography and Imaging" and "Forward March of Facimile and Electronic Mail."

Further information can be obtained from the institute at 375 Commonwealth Ave., Boston, Mass. 02215.

Runs at 1,000 Line/Min

Printer Extends Chaintrain Line

MALDEN, Mass. — Data Printer Corp. has announced an addition to its printer family, the Chaintrain Model 1210, which it claimed offers a 1,200 line/min printer's features for the cost of a 1,000 line/min printer.

Using a horizontal moving font line technique, the 1,000 line/min printer is said to provide precise vertical print alignment. A 64-character print

set is standard on the device, and character sets of 48, 96 and 128 characters are optional.

Full Line Buffering

Full-line buffering is also provided on the microprocessor-controlled unit, the company indicated, and the unit can accept six-part forms from 3.5- to 19.5 in. wide. A motorized upper and lower

tractor aids in precise print alignment.

The Chaintrain 1210 costs \$14,675. A free, 30-day in-house trial is available for interested parties, the company said from 99 Middlesex St., Malden, Mass. 02148.

High End Added To Taurus Series Of Badge Readers

LAMBERTVILLE, N.J. — Taurus Corp. has added a high end to its series of hand-operated, self-contained badge and card readers without moving parts. The solid-state unit can be easily interfaced with a wide range of host systems, a spokesman claimed.

The Model H-68 is capable of reading up to 68 standard card columns. An optical reading system using infrared LEDs and the absence of moving parts are said to contribute to a long product life and minimum maintenance.

Units Can be Customized

Available as a free-standing or panel mountable unit, the H-68 and the other three models in the series can also be customized by the company, the spokesman noted.

Readout on the devices is column-serial and row-parallel. Various forms of output formatting including bit-parallel, Ascii and Teletype code are available.

The devices sell for \$375 in quantities of one to 24 and \$295 in multiples of 100, Taurus said from Academy Hill, Lambertville, N.J. 08530.

Scopus Unveils Short-Reel Tape

LOWELL, Mass. — A lightweight, short-footage reel of computer magnetic tape recently introduced by Scopus Corp. fits the hubs of all standard tape drives and weight 3.5 oz., according to the company.

Use of the 150-ft, 4.5-in.-diameter Mini Reel results in lower mailing and shipping charges, a spokesman said.

The Mini Reel comes with a styrene cover and costs \$4.35, the company said from 710 Chelmsford St., Lowell, Ma. 01851.

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Pierre Lamond
Technical Director

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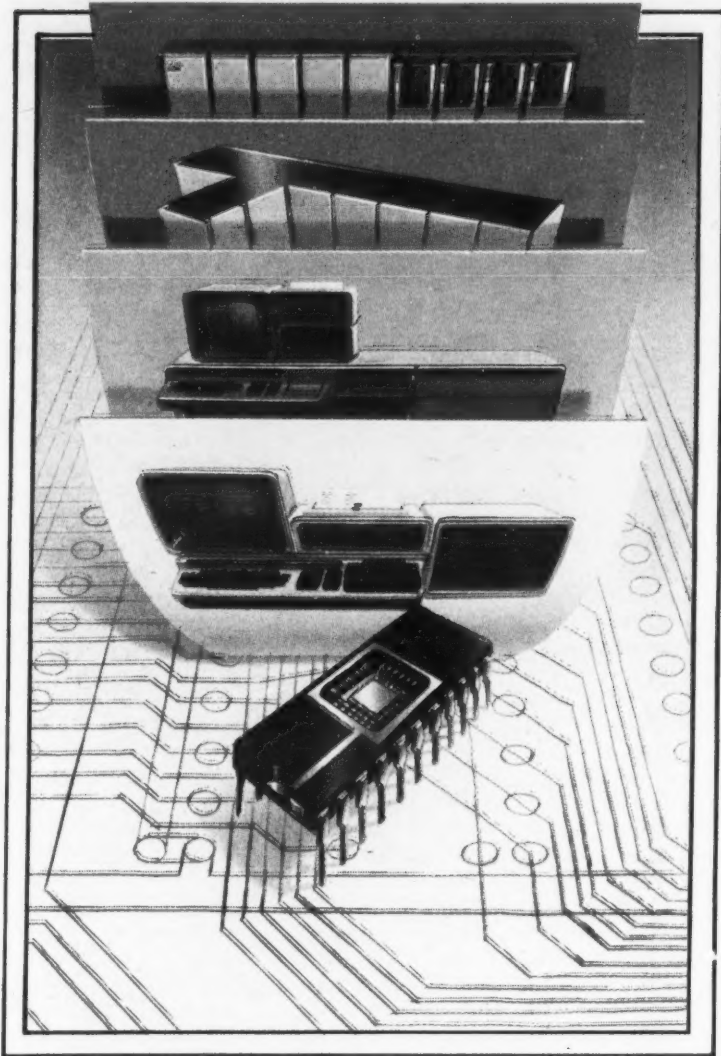
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formance, reliability and price they won't find anywhere else.

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If there's more I can tell you about National Semiconductor, and the directions we'll be taking in the next ten years, I'd be glad to fill you in. Write me personally: Pierre Lamond, Technical Director, National Semiconductor Corporation, Drawer 19, 2900 Semiconductor Drive, Santa Clara, California 95051."

Computer Products Group
≈ National Semiconductor Corporation

Bank Personnel Cash in Using Key-to-Disk

(Continued from Page 43)

Immediately after the bank installed the equipment, Johnson collected production statistics for a period of two months, without mentioning this to the data entry supervisors. These statistics, including error rates and hourly keystroke rates, have been incorporated into a production standard.

Operators receive additional pay when they top the standards, and a worker's pay is calculated by a statistics package on the mainframe and reported to each operator on his weekly report.

Johnson said the operators reacted favorably to the production/pay plan. "Now the operators set goals for themselves, and since those goals are backed up by money incentives, there

is something to work for," he said. "And we don't mind paying the extra salary when we have top-quality operators who are worth it."

In addition to increasing production and efficiency, the statistics package eliminated some of the bank's personnel problems.

"In the past, salary reviews were based on performance evaluation made by the key entry supervisor," Johnson stated. "If an operator didn't agree with that evaluation, we had the potential for conflict."

Variations in Difficulty

Johnson acknowledged that not all data entry jobs are equally demanding. In particular, he noted, jobs with a lot of alpha information, or ones with

smaller input forms, are more difficult. To account for these differences, such jobs are weighted at 1.5 times the actual keystroke rate; thus, an 8,000-stroke "difficult" job is considered equivalent to a 12,000-stroke "easy" job. This means such jobs are no longer shunned, Johnson indicated.

The bank is using an 11-station System 1200 key-display system from Mohawk Data Sciences of Parsippany, N.J. The 48K-byte configuration also has a 1,600 bit/in. tape drive and automatically collects statistics as each job is done.

Linda Williams, data entry supervisor, said that operators adapted easily to the system. "All they have to do is follow the instructions of the prompt display... even though we had a

lot of support from the vendor, we were able to do most of the training ourselves."

In mid-1977, the bank developed a statistics package to allow the system to collect more data and thus give it greater control over production. As a result, it now has access to a breakdown of each operator's production as well as overall production reports.

Monthly and weekly reports show any work that was not verified, an analysis by operator and an analysis by each individual key entry source document.

Using the information, the bank redesigned the layouts on the key entry source documents for three major applications totalling 25% of its data entry volume.

"We have absolute control over our production," Johnson said, "and we have unbiased information on which we can evaluate a key entry operator's performance."

"In addition, each operator's work is broken down so we know his or her strong and weak areas," he said. "We give this report to each operator so he can take advantage of this information."

"With these refinements of our operations and the production/pay plan, our overall key entry productivity jumped 34% in six months," Johnson said. "Our overall shop average is much more than 12,000 keystrokes per hour."

Johnson cited the customer loan application form as a prime example of the bank's former production problems. "We tested our best operators and they could not break 10,000 keystrokes per hour," he said. "We found that the input was in a difficult sequence for our operators to key."

"The form was rewritten and the data entry formats redesigned — and now our average production for that job is more than 14,000 keystrokes per hour," he said. "Many of the improvements in key entry forms and procedures are accomplished with no software changes of any kind on the mainframe. For example, one feature of the system allows operators to enter data in a format that is different than the actual physical layout; the system then automatically reformats the data when it is dumped to tape," he explained.

The bank has no immediate plans for upgrades. "We are now enjoying the benefits of the equipment," Johnson said. "Our production is up and the error rate is the lowest we have ever experienced. In addition, we know exactly what is being done."

"Finally, we have a pleasant work area with no noise, and the operators are happy and working fast, but accurately, to take advantage of the production/pay plan," he said.

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Lack of Products Causes Delays User Endures Eight-Month Switch to DDP

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NEW ORLEANS — When E.R. Squibb and Sons, Inc. decided in 1974 to convert from IBM 360/20s at nine branches to a minicomputer-based distributed data processing (DDP) system, much of the needed hardware and software was unavailable from vendors, according to Joanne Finch, manager of the Minicomputer Services Department at Squibb.

Difficulties arose from the lack of vendor products and the time it took central site batch programmers to grasp the nature of on-line systems. Despite these problems, the Squibb system was implemented only eight months late and is now performing well, she told a workshop at International Data Corp.'s recent conference on DDP here.

Finch advised users considering conversion to DDP to select a vendor carefully and to interview other users since they may provide excellent guidelines. One should also be sure that plans apply to the company's needs and that technical compatibility requirements — for example, terminals interfacing with operating systems — are met.

Design Changes

Systems are not always static in design, and Squibb's scheme was no exception. The original plan called for replacing the 360/20s at the nine branches — which provided on-line order entry — with Digital Equipment Corp. PDP-11/40s.

The nine branches would be restructured into five branches and four satellites. Thus the new plan bore little resemblance to the original one.

While the changes were being made, the users at the branches decided it would be advantageous to expand the scope of the systems' jobs, so the plan was changed to five PDP-11/70s, each with 512K bytes that would send daily updates via IBM 2780 emulation to the central 370/155.

Meanwhile, Squibb had set up a task force with a representative user who provided valuable input and kept the users at the branches involved. While the project did not determine when it would freeze specification changes, it did try to keep on top of vendors' developments.

Series of Problems

Some of the problems Squibb encountered appeared major, but whenever something was not available from a vendor, the Squibb DP department tackled the task. Often this amounted to a dead end because a vendor would offer an equivalent product by the time the Squibb team devised its solution.

In many cases, Squibb preferred vendor offerings that would not require in-house support.

In retrospect, Finch thought the project could have been finished in the same time frame if it had been started a year later.

The Squibb plan was committed to the DEC RSTS operating system, but that didn't support remote printers, so Squibb had another problem with which to contend.

Finally it learned DEC was coming out with a bisynchronous printer supported by RSTS. However, Squibb's

whole system was based on asynchronous transmission, so it persuaded DEC to make some asynchronous versions.

After an effort by Squibb to solve the lack of error correction capability on the lines to the printer, Codex Corp. came out with the solution: an intelligent multiplexer, the 6030. Prior to the Codex product, Squibb had developed a microprocessor-based device.

In 1974, there was no Cobol; there were no DEC VT52 CRTs, which Squibb wanted. After looking at terminals offered by different firms, Squibb opted for Infoton Corp. units. At the time, Infoton had its own maintenance force, but it no longer does. When

Squibb changed its plan from a PDP-11/70 at each site to only five sites, DEC did not want to maintain its gear — printers that were in the satellite sites without CPUs, for instance. In addition, the purchase discount changed because of a fewer number of CPUs, Finch noted. So at one time Squibb didn't know what the total cost would be.

Inadequate Throughput

Software was a problem, too. Squibb got its applications done in time, but the throughput on the system for its order entry application was inadequate, she said.

Squibb had to wait a few months un-

til DEC released Basic Plus II. Squibb helped debug it and now gets the throughput it desires, with each order entry taking less than 1.5 min.

Despite the problems, the system is up and running, and it looks like it can be easily expanded.

The system's hardware cost about \$2 million and its software about \$1 million. About 20 man-years of effort went into the project, Finch noted.

Squibb's biggest oversight was its failure to realize that RSTS wasn't commercially oriented. It was too easily saturated by similar applications, such as the various procedures in data entry, with operators trying to get at the same files at once, she explained.



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System Helps Keep Store Shelves Well-Stocked

NEW YORK — Korvettes, Inc., a large retailer headquartered here, is using a computerized distribution system to speed movement of incoming merchandise from warehouses to its stores in this area.

The system, written by Datamor, the company's DP subsidiary, has helped the company significantly shorten the time required to get merchandise where it is needed.

Korvettes' On-Line Mer-

chandise Management and Distribution (Kommand) was designed to facilitate the receiving, processing and distribution of materials, according to Datamor President Morton Weitz. "Management found it was losing two to seven days in the process of receiving and distributing merchandise from the warehouse and distribution center. It was agreed that we needed a system that would enable the warehouse

to turn merchandise around quickly in its limited space," Weitz said.

"The system was also designed to eliminate paper handling steps, the main cause of our problem, as well as to ensure accuracy," he continued.

Korvettes uses an IBM 370/158 running under MVS with 5M bytes of memory. This system is linked via phone lines to IBM 3277 CRTs in the

company's warehouses in New Jersey and Long Island. In addition, the system is linked to Four-Phase Systems, Inc. minicomputers, which print shipping labels and price tickets for the incoming merchandise.

"With 95% of Korvettes' soft goods and 80% of the store's hard goods routed through the Bayonne warehouse, distribution operations were one of management's greatest con-

cerns," Weitz noted. The system was developed to ensure distribution "within our goal of 12 to 24 hours after all merchandise is received," he added.

Initial Functions

The system first comes into play when a buyer at the company's Manhattan headquarters generates a purchase order. The order is stored in the system until the shipment arrives at the warehouse, when the receiver can verify that it is correct and notify the home office of its arrival.

If the merchandise has been predistributed, it can be received, ticketed and distributed to the stores within three hours. Otherwise, the warehouse notifies the appropriate home office merchandising staff of the arrival, and the staff can then furnish the warehouse with instructions for distributing the goods.

This process eliminates the time lag that had been required when buyers were notified via hard copy.

In addition, Weitz noted, "the transcription of information and the possibility of error has been dramatically reduced."

Mike Berenson, senior vice-president and general manager of Datamor, added that the system has helped Korvettes "by improving home office and warehouse communications. By knowing when merchandise is scheduled to arrive at the warehouse, eliminating the search for purchase order documents and scheduling the carriers in an appointment routine, Korvettes is now able to move merchandise immediately."

Berenson added that the system could allow Korvettes to have the incoming merchandise delivered directly to individual stores if Korvettes wanted, but that centralizing the operation is cheaper for the company. In addition, the use of the computer gives the buying staff and management significantly greater control over buying and shipping of merchandise.

How has the system worked? "We are accomplishing our objectives while processing about 20% more merchandise through our existing warehouse structure," Weitz said.

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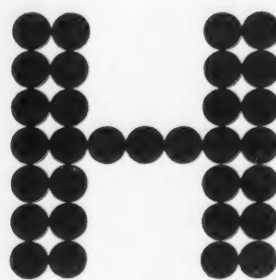
Vol. 3 No. 6 Nov./Dec. 1978

Thin film technology:
The HP2621P
printing terminal

Innovations in
dot matrix printing

System 35 desktop
computer

HP does it with dots



ewlett-Packard has advanced the technology of dot matrix printing with a line of thermal and impact printing products that are both flexible and reliable, and offer good price/performance ratios.

The flexibility to place dots in any arrangement means that multiple character sets can be developed—and graphics can be printed with high quality and accuracy. A matrix of dots can be used to describe virtually any character set or graphic display including: diagrams, subscripted and super-scripted print, graphs, charts, super-size print, labels (at any angle), and special decorative effects.

Hot dots

In thermal printing, characters in the form of dot matrices are inscribed on heat sensitive paper by energizing the resistors on a printhead. Inherent in this process, however, is the problem of overheating the resistors. When they become too hot, the letters smear.

To print the first dot, a resistor is heated with that amount of energy required to heat a completely cooled resistor. After the dot is printed, the resistor cools, for example, to approximately 75% of the original energy level. To print the next dot, the resistor is fired up again. It is now at 175% of the original energy level and getting hotter by the dot.

There can be problems in high speed thermal printing:



The HP2621P prints 2160 dots per second. Yet, by using a microprocessor to control resistor heating and cooling, print isn't light or smeared.



Uncontrolled, the process can continue and continue until the resistor eventually becomes so hot that the print begins to smear.

Hewlett-Packard's HP2621P thermal printing terminal meets this challenge with two innovations—controlled resistor energizing and efficient printhead cooling.

Controlled dot energizing

The HP2621P's microprocessor enables rigid control of the amount of energy given to a sequence of dots to ensure clear, crisp printing. After a dot is printed and the resistor cools, it is heated to a reduced energy level—just enough to print the next dot, not enough to smear it.

Specifically, we give the first dot of a sequence an extra amount of energy to allow full dot development. Subsequent dots are given only enough energy to maintain high-quality print.

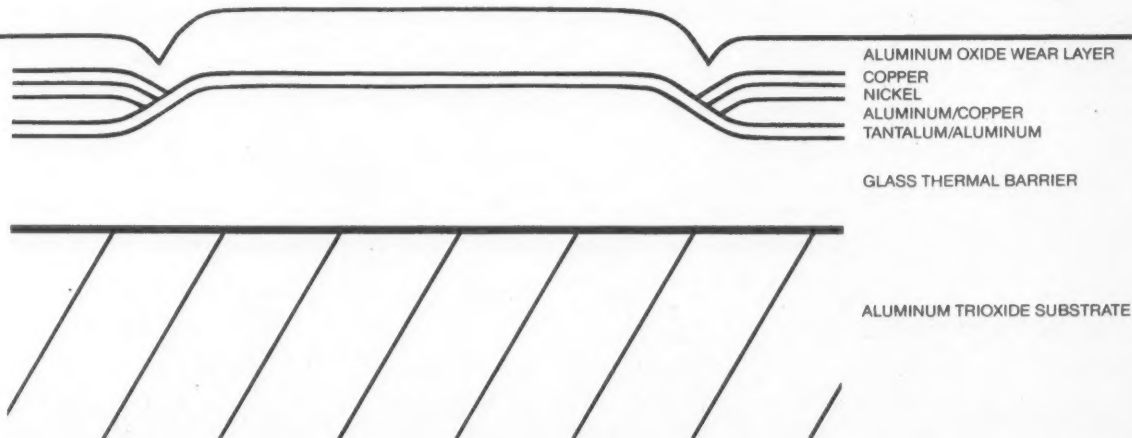
Cooling glass

Many years of experience in thin-film technology have helped us develop a printhead which ensures not only effective resistor heating but cooling as well.

The HP2621P printhead is composed of multiple layers of conductive and resistive materials applied to the printhead surface through an innovative magnetron sputtering system. In addition to these layers, there is a glass thermal barrier. The relationship between the resistive/conductive layers and the thermal barrier's thickness is crucial to heat

◀ Cover

The innovative thin film printhead of the HP2621 is shown greatly magnified on our cover, and here as a diagram (not drawn to scale). We have implemented an exceptionally thin glass thermal barrier to optimize heat transfer and enable clean, clear printing, even at speeds of 120 characters per second.



transfer. Too thick a barrier and the resistors are hard to heat. Too thin a barrier and too much heat escapes. The HP2621P utilizes an exceptionally thin glass barrier to promote the efficient heat transfer so essential for clear, high-speed printing.

Few moving parts

The HP2608 line printer is the result of a design challenge—to develop a highly reliable, medium speed line printer with precise dot positioning for graphics.

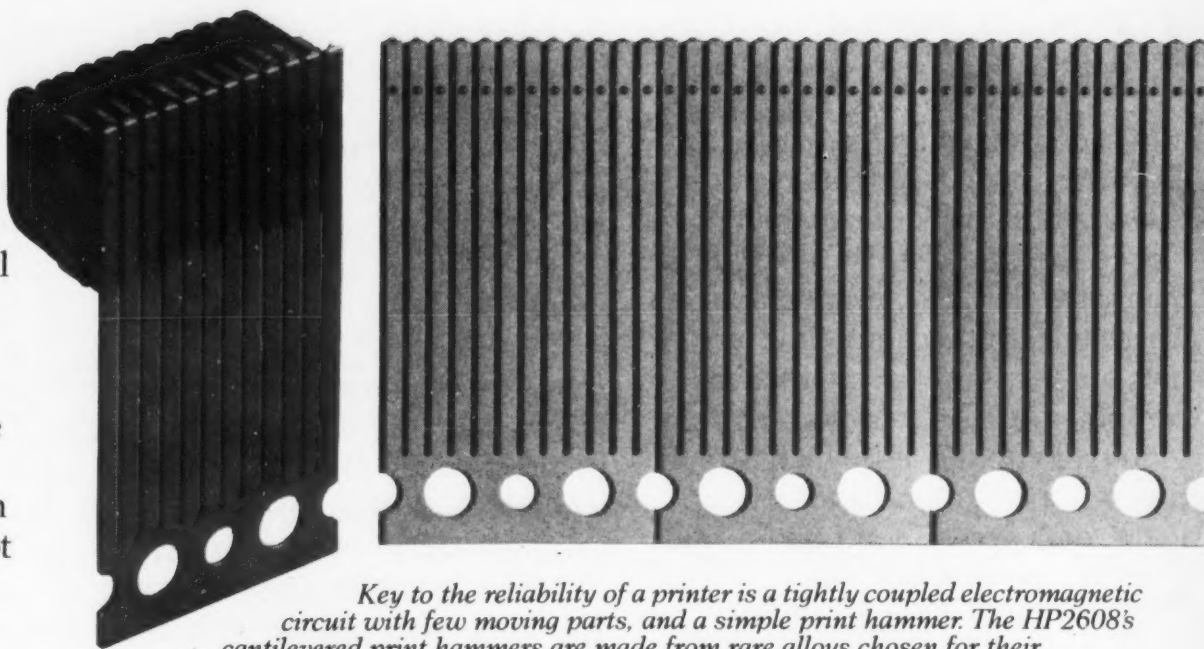
Typically, dot matrix printers have approximately 25% fewer parts than full-font character printers. The fewer moving parts a printer has, the greater its reliability. The high reliability of the HP2608 is achieved by a virtually frictionless print mechanism.

Ordinary printers rest the print bar on ball bearings and move it via stepper motors. The HP2608 has a mechanically balanced print

The HP2608 has a virtually frictionless print mechanism.

bar on stainless steel springs or flexures. A voice coil linear motor moves the print bar back and forth.

An innovative concept in printers, this approach is drawn from well established technology in disc drives and audio speakers. The result—no rubbing parts. No ball bearings to wear out.



Key to the reliability of a printer is a tightly coupled electromagnetic circuit with few moving parts, and a simple print hammer. The HP2608's cantilevered print hammers are made from rare alloys chosen for their magnetic and stress qualities. For increased reliability, the print balls are securely soldered to the hammer using a proprietary HP microwelding technique.

Precision printing

To ensure high quality graphics, you need precision dot placement. The HP2608 has a cantilever beam print hammer and a drive coil for each of 132 character positions. During printing, each hammer is pulled back and released by an electromagnet. The hammer moves with a velocity defined by its resonant frequency.

To accurately position dots, all hammers must be driven at the same time. We use one drive pulse to guarantee simultaneous striking of all hammers. Printers which drive hammers individually have varied timing and dot placement.

Often, line printers produce characters and graphics that smear, ghost, or have light and missing areas caused by excessive vibration. We damp our hammers by placing a small, properly tuned spring behind each hammer and by using an electronic damping pulse. As a

result, character ghosting and overstrikes are virtually eliminated.

Precision graphics require precision tooling. We maintain exceptionally tight mechanical tolerances on machined parts—tolerances usually found only on higher priced printers.

Specially selected alloys are used in the construction of the HP2608. Chosen for their magnetic and stress qualities, these metals give additional durability and reliability to the printer parts. Tungsten carbide, an extremely hard element often used for high speed cutting tools, is used for the head or ball of the hammer. The cantilevered print hammer beam itself is made from an alloy selected for its magnetic traits. HP uses an innovative microwelding technique to bond these alloys together to form the hammer.

For more data on the HP2621 and HP2608, check A and B on the reply card.

The one-stop shop for terminals, printers, systems

HP2621

All too frequently low-cost character mode terminals mean a disappointing lack of capability. Not so with Hewlett-Packard's new interactive HP2621 terminals.

These teleprinter-compatible terminals are designed for interactive computer applications such as data inquiry, computer-aided instruction, program preparation and development, data access and update, and general time-sharing.

The HP2621 terminals have many of the features found on the successful HP2640 terminal family. All offer refreshed raster scan technology, high resolution CRTs, the full 128 ASCII character set, off-screen storage, and built-in editing functions.

Instant hardcopy

Until now, getting a permanent record of your terminal activity was often expensive and inconvenient. Printers sometimes cost more than the terminals to which they are connected. In addition, if several terminals shared a printer, you may have had to wait for access to the printer and then walk to another area to pick up your print-out. Not any more. Since the HP2621P terminal has an integral, compact thermal printer, hardcopy is available where and when you want it.

There are advantages to integrating a printer and terminal.

Both can share the same power source and the same housing. This reduces our costs—which keeps your price low. And thermal printers are quiet—suitable for a variety of work environments.

120 char/sec

The HP2621P prints fast—120 characters per second. It can print twenty-four full 80-character lines bi-directionally in less than 18 seconds. To do this, HP uses a smart carriage return—a known technique for increasing printer speed. In addition to printing from left-to-right or right-to-left, a micro-processor automatically computes the length and last character

position of the next line of text, and then prints that line in the fastest, most efficient direction. A typical page of text prints in 10-12 seconds.

Reliability and high resolution

A potential cause of printer failure is the printhead/flex-circuit cable connection. Typically, print-heads are attached to cables by wire bonds or metal clamps that tend to open up. Solder forms a more dependable, solid bond. On the HP2621P, the long-life printhead is soldered firmly to the cable and typically can withstand three pounds of 90 degrees vertical pull as well as a 10 pound tensile lift.

Both the HP2621A (no printer) and the HP2621P use high resolution CRTs of the same quality as our popular HP2640 family.

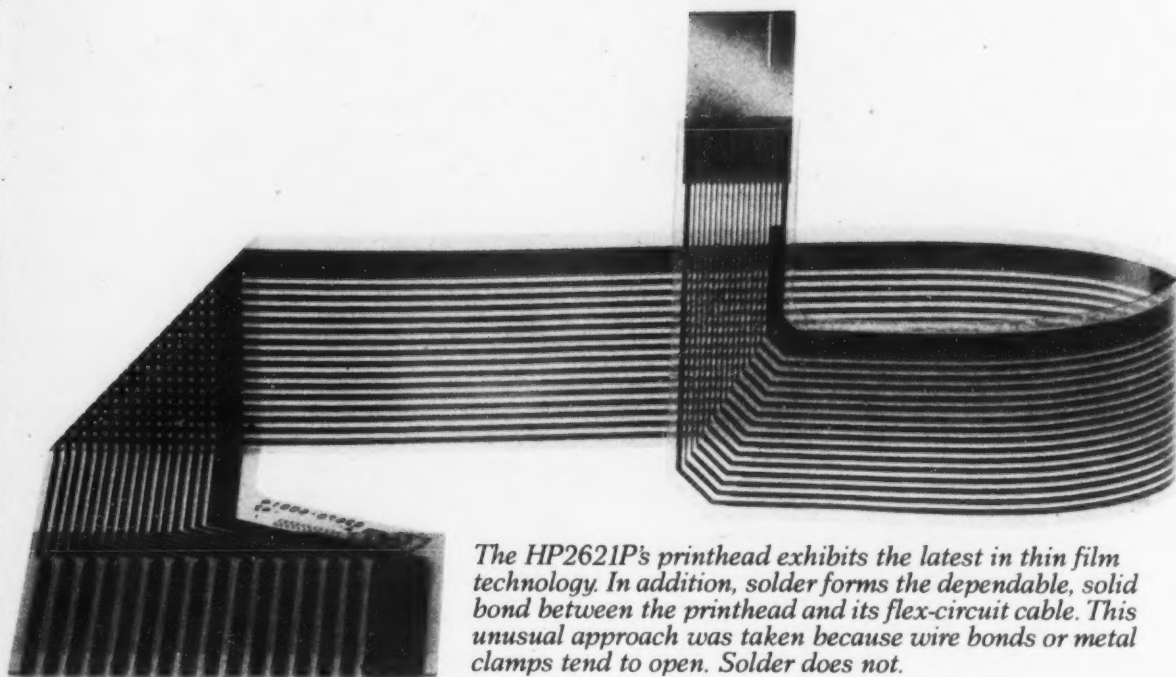
High resolution results from a 7x9 dot character matrix within a 9x15 dot character cell. In addition to better character definition, this 9x15 cell size provides for descenders on lower case letters and a character-by-character underline. Readability improves from wider spacing between characters and rows.

Two-page memory

The HP2621 terminals can store up to 48 lines (two full pages) in its 4K bytes of display memory. In



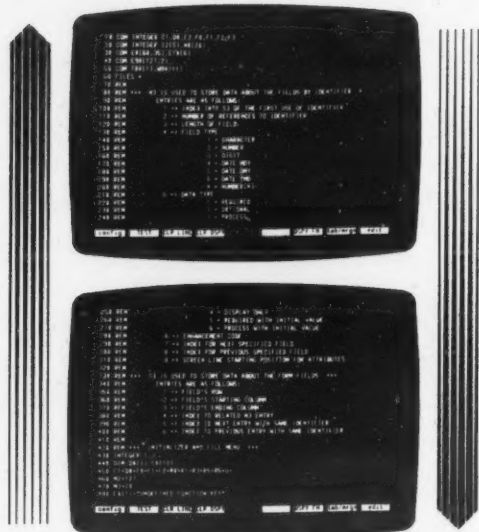
Seeing double? HP's low cost, character mode terminals, the HP2621A and the HP2621P, are nearly identical. The difference? The HP2621P has instant hardcopy.



The HP2621P's printhead exhibits the latest in thin film technology. In addition, solder forms the dependable, solid bond between the printhead and its flex-circuit cable. This unusual approach was taken because wire bonds or metal clamps tend to open. Solder does not.

text generation and program development, the ability to conveniently view 24 lines, either page-by-page, or by scrolling, line-by-line, can save time and reduce errors.

The HP2621 terminals add local editing to interactive applications.



Scroll up and down through a full two pages of memory with the new HP2621 terminals. This convenience saves programming time and reduces the potential for errors.

Neither requires software development or modification on most systems.

With line mode, each line of data from the keyboard is buffered for editing until the return key is pressed. Because these terminals

can distinguish between data sent by the computer and keyboard entered data, operators can locally edit replies to computer generated questions. Only desired data is entered. In modify mode, any line in the terminal's 48-line memory can be edited and then retransmitted without retyping the entire line.

Interested in a low-cost data inquiry terminal for interactive applications? The HP2621A sells for \$1450* while the HP2621P sells for \$2550*. For more details on the entire family of data terminals, check C on the reply card. Check A for the HP2621.

Impact Printing

Hewlett-Packard recently introduced three new dot-matrix, impact printing peripherals: the HP2608 line printer, the HP2631G serial printer, and the HP2639 serial printing terminal. Because they use dot matrices, there is virtually no limit to the number of character sets that can be defined for the printers now or in the future. Among current offerings are character sets for most European languages, Arabic, Cyrillic, Katakana, and line drawing.

Reliable and convenient

The use of microprocessors in these new products means fewer electronic components and fewer high-priced mechanical parts. And that means greater reliability.

Plus, we put our impact printing products through rigid environmental and reliability verification tests (RVT). Randomly selected units from inventory are operated 24 hours a day, five days a week for the equivalent of one full year's average usage each. Results are documented in our RVT brochure. If you want to see what punishment these products can take, check D and we'll send you a copy.

Our new printing peripherals use a long-life, mobius loop ribbon cartridge. To change ribbons, just pop out the used cartridge and drop in a new one. No mess. No inky fingers.

HP2608

Designed as a medium speed line printer, the HP2608 is capable of printing over two million lines per month at a rate of 400 lines per minute. And, the HP2608 has graphics capability.

Precisely positioned dots are printed in a matrix form with a density of 5040 dots per square inch. Dots can be placed anywhere on a page within 0.03 mm accuracy. A 10 by 13 inch page can be printed in less than 20 seconds.

System flexibility

HP2608 line printers can be placed almost anywhere they are

Continued from page 5.

needed—up to 1000 feet from a connected CPU. For applications with extremely large output requirements, several HP2608s can be used in a multiple printer approach.

Rugged, yet quiet

Rugged enough for EDP applications, yet quiet enough for most office environments, the HP2608 provides noise reduction and ease-of-use features usually found only on more expensive printers.

The HP2608's stand is completely lined with sound absorbent foam with special deep recesses around the access cover to keep the noise sealed inside. An optional sound cover is also available.

The stand holds printer paper and has storage space for extra ribbon cartridges. A paper tray is positioned on the back of the stand to hold printer output.

Paper alignment is easy. You can move the paper up and down electronically with one dot row accuracy, using either the guide on top of the printer cover or the precision forms alignment guide inside the stand.

The HP2608 sells for \$9250*
For more information select B on the reply card.

HP2631G

The new 180 characters per second HP2631G serial printer has all the features of the popular HP2631A—plus graphics.

The HP2631G accepts HP's



The HP2631G impact, serial printer accepts raster data from HP2647 or HP2648 graphics CRT terminals to produce accurate, high-quality graphic images without distortion.

raster data format from CRT terminals to produce exact graphic images without distortion. In less than 50 seconds, a typical 10 by 5 inch graph can be printed from the screen of an HP2647 or HP2648 graphics terminal. There's even an optional high density character set which nearly doubles the horizontal dot density—providing greater character clarity with only 50 percent loss in print speed. You can programmatically select four print sizes, line spacing, and page/text lengths. Also, an automatic perforation skip mode can direct the printer to advance automatically to the top of the next page when the printing reaches the bottom of the specified text length. Forms up to 255 lines can be handled.

Interested in a high quality serial printer with raster dump graphics?

The HP2631G sells for \$4250*
For details, check E on the reply card.

HP2639

The HP2639 interactive printing terminal can be used with a broad range of systems in a variety of applications, and is specifically manufactured for OEMs and end users of non-HP systems.

The HP2639 provides all the features of the HP2635 printing terminal as well as a flexible, asynchronous, serial interface. It sells for \$4205* complete with keyboard. OEM discounts are available. **For more information, select F on the reply card.**

*U.S. prices only.

Minicomputer power; desktop convenience

Don't be deceived by appearances. Under the guise of a desktop computer, the System 35 gives you all the power of a minicomputer. Its high performance, 16-bit parallel CPU has typical instruction times of less than two microseconds. Yet, processor, keyboard, memory, mass storage, CRT and printer are integrated so compactly that they fit neatly on the top of your desk.

Large internal memory

The System 35 features a surprisingly large internal memory. Up to 256K bytes can manage an array of 30,000 numbers with 12-digit precision. A wide range of interface capabilities make the system ideal for data acquisition and controller applications. It is fully HP-IB compatible* and supports a wide range of peripherals.

Language power

The System 35's major contribution to desktop computing is a combination of complementary programming languages—BASIC and Assembly language.

BASIC is an interactive language that is both simple to learn and easy to use. The System 35 runs standard ANSI BASIC and is enhanced with sub-programs, numeric array instructions, and multicharacter identifiers—features normally associated with FORTRAN and APL.

An optional Assembly language capability optimizes program efficiency in terms of I/O and computation speeds. You can significantly decrease application program run times by isolating

those segments of a BASIC program that are potential bottlenecks and coding them instead as an Assembly language sub-program. Certain specialized computations and I/O operations may actually be executed as much as 100 times faster in Assembly language.

Rapid Assembly

You can enter Assembly language source code through the keyboard as part of a BASIC program. Each line is checked syntactically the instant it is stored in memory. The ROM-based assembler performs at the rate of 1000 lines per second: turnaround is practically instantaneous.

The System 35 provides automatic editing capabilities which enable you to enter and edit your applications interactively. There is no need to call in special debugging or editing routines; they are inherent in the language and resident in memory. Or, you can write

your own special function debugging programs.

Once your application is entered and edited, it can be reassembled in a matter of seconds.

You can also interactively modify by single stepping through your Assembly programs. Each line of the original source code can be displayed for review. Variables can be examined and modified by name.

Compatible systems

The System 35 protects the software investment of HP9825 OEMs and end users who wish to add it to their existing systems. A translator is provided to convert HPL software to System 35 BASIC. In addition, BASIC is fully compatible with both the System 35 and 45.

The System 35A with CRT costs \$9900** The System 35B with single-line LED display, ideal for run-only applications, is \$8700** Both systems have 64K read/write memory and 217K byte cartridge tape drives.

For more information, indicate G on the reply card.

*IEEE 488-1975

**U. S. prices only.



New & Noteworthy

On-line transaction processing system helps reduce inventories.

A manufacturer's on-hand inventory often represents substantial capital and carrying costs. But when material requirements are planned and controlled, inventory often can be reduced. Even a slight improvement in controlling inventory can have a major effect on profits.

Hewlett-Packard's materials planning and control system, MFG/3000, is ideal for manufacturers who produce multi-piece products in lots or batches. Utilizing the speed and power of an HP3000 Series II or III computer, MFG/3000 software can help to significantly reduce your manufacturing inventory.

MFG/3000 is three interrelated materials planning and control products. One stores bills of material, standard routings, and descriptive part data. Another keeps track of stockroom inventory as well as manufacturing and purchase orders; while the third suggests inventory procurements based on a customer's master production schedule.

With MFG/3000 you can avoid under or over-stocked conditions, recognize upcoming line stoppages due to material shortages, and meet your customer commitments with more certainty.

Proven results

Vydec, Inc., a user of MFG/3000

since January 1978, manufactures and markets floppy-disc-based word processing systems. While increasing sales and production by 100 per cent, Vydec has reduced its months-of-supply inventory by 30 per cent.

With MFG/3000, terminals are strategically situated so that as inventories change, data is immediately entered into and validated by the HP3000. Each department captures an up-to-the-minute snapshot of inventory status. And, as is necessary in many transaction processing environments, user interactions are designed to accommodate people with little or no computer or programming experience.

Vydec's materials manager, Marty Connolly, states, "Because MFG/3000 is an on-line system, we are able to reduce the time between receiving a market forecast and preparing its MRP to one or two days—versus about 14 days under the old system."

Quick implementation

MFG/3000 is a fully-developed, performance-tested package—complete with data base and flexible forms capabilities. No user programming is required for MFG/3000 implementation. And Hewlett-Packard provides the same high level of support commitment as for our HP3000 operating system.

Cutting implementation time and maintenance costs lets you direct your programming resources towards other needs within your company.

Know before you buy

Even before installation of an MFG/3000 system, we consult with customers to discuss their specific needs and the terminal throughput and response time they can expect based upon our documented transaction performance studies. Plus, customer training courses and implementation schedules are suggested.

John Doyle, plant manager for Vetter Corporation (a manufacturer of motorcycle fairings, and another MFG/3000 user), states "We knew what we were getting before we purchased. We felt confident we'd get full support from HP. We were right."

Each element of MFG/3000 sells for \$5,000* with a monthly maintenance cost of \$150*.

Interested in the cost savings of materials planning and control? **Check H for more information.**

*U.S. prices only.

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Project Management: A Formula for Success

Part 1

By John D. Toellner

IN DEPTH IN DEPTH IN DEPTH IN DEPTH

The cost of developing new systems is rising in every type of organization. Business is getting more complex, and the opportunities for developing more effective systems have improved with the advent of data bases, distributed processing and other technological advances.

Because of the coupling of this dollar value emphasis with an unattractive track record in the management of new systems development, the subject of project management is coming into critical focus for an increasing number of users.

Project management refers to the process that covers systems planning, priority setting, effective design, good visibility on status and quality documentation. Effectiveness cannot occur in each of these areas unless the systems and programming group organizes so true project management can take place.

The press for change has been sparked by the existence of a series of common, serious problems:

- Projects are consistently completed late and cost more than estimated.
- Users are not satisfied with the final product.
- New systems do not adequately take advantage of new technologies.

- Documentation is inadequate in quantity and quality.
- Managers and users do not know where things stand.

The solution for these problems is not difficult to develop conceptually, but requires the implementation of some management tools and the restructuring of the organization. In developing a project management system and the structure to support it, the following needs should be served:

1. *We should involve management in a meaningful role.* This involvement should be concerned with items of scope, take a small amount of time, members of management to make a needed contribution and require them

to use only standard business skills without becoming experts in data processing.

2. *Users should be deeply involved.* They must protect the interest of their departments in the development of new systems. They should be requested to do things where there is a real need and be assigned tasks they can handle. We should require only a small amount of their time.

3. *Guidance should be provided* to the next available staff member on what project he should work.

4. *Project work should be controlled* closely without encroaching on the professionalism of the staff members and should require a minimum of paper work and administrative time.

9. *The DP staff should get completely and firmly out of the priority-setting business.* It should place itself in an environment where it never has to say 'no' to a user.

The nature of project management causes natural separation between development and maintenance work. By maintenance work, I mean emergency maintenance, planned maintenance, modifications, enhancements and smaller projects.

Efficiency can be gained by segregating the development teams from the maintenance group. When an individual is given a mixture of tasks with one task having high-pressure deadlines and the others having less critical time requirements, the high-pressure task

plication knowledge, greater flexibility exists for the assignment of development personnel to the next available project. Maintenance and smaller project personnel, however, are more efficiently kept within a particular application area.

When the groups are separate, it is then possible to prepare bar charts, or other visual displays, that show the time frame in which systems will be implemented. This is possible because of the knowledge of the size of each project and the number of development people, assuring that these resources will be available and not siphoned off to work on maintenance or other high-pressure activities.

In addition, separating the development teams and the maintenance and small project personnel also simplifies the priority-setting process.

Many systems and programming organizations are also divided into functional subgroups to directly support a group of user departments. This is a natural and desirable division because of the complex nature of some systems which may require extensive experience and an understanding of the user's business.

If these subgroups exist, I suggest that each of these functional divisions be further

subdivided into development and into small project groups to obtain the benefits described earlier.

It is assumed that a project manager (or project leader) exists for each development team and that he reports to the head of a group. Frequently the entire small project and maintenance crew reports to a single supervisor or project manager.

Priority setting is a recommended process for both large and small projects. It permits the users and executive management to decide which work is most important to the organization.

The only work that is exempt is true
(Continued on In Depth/2)

How can you tune an entire organization for effective project management? This week the developer of a project management system suggests the changes needed on the corporate, DP and user levels, and next week he will address more specifics — estimating, performance standards, design freezes and implementation among them.

5. *The staff should receive clear guidance* on exactly what is required in each step of the project. A review process should examine the work developed at each step.

6. *Systems should be turned over to the operations and maintenance groups in a 100% documented condition,* and the documentation should stay that way when maintenance changes are made.

7. *Projects should be made to stay within budget and schedules* at each stage of the work.

8. *Excellent visibility should be maintained at all times* on where things stand and when future events should occur.

will always grow to absorb the majority of time. When maintenance and development activities are assigned to the same individual, the maintenance work will normally win, which is one of the reasons development projects consistently lag behind schedule.

Familiarization with individual systems is a key point for efficiently carrying off maintenance and small project work. This degree of familiarity is not so important for development because of the unique nature of each development effort. Often the development effort involves systems that do not exist within the organization or an excursion into new technology.

Because of this lessened need for ap-

IN DEPTH

(Continued from In Depth/1)

emergency requests. The authority to immediately execute emergency projects is normally delegated to the systems programming manager. This is a satisfactory process as long as it is not abused.

For a development group, a recurring decision must be made. Tomorrow or next week or next month a development team will finish a project and be available for a new assignment. A decision is on which project the individu-

als will be assigned to tackle next.

Who makes that decision? Any project that is estimated at more than \$20,000 or six man-months should be classified as development, in my opinion. With this type of price tag, it is large enough to deserve executive management's attention.

Establishment of a permanent management priority-setting group is recommended. The group should be composed of individuals at the vice-presidential or general manager level

from each of the major operating departments which are frequent customers of systems and programming services. Such an executive-level group normally meets quarterly and sets the priorities on all project work, placing project proposals in rank sequence.

The group's efforts frequently result in a schedule displaying the next three to five years' work for the systems programming and development teams. The following year is considered to be

firm, with subsequent years being more advisory in nature.

The plan and schedule is always kept up to date through quarterly meetings. This process of placing projects in rank sequence requires executive management to use only standard business skills.

Small Projects

Like the executive-level group for large projects, a decision must be made as to which new assignment a person will be given when a small project or maintenance programmer becomes available. Again, the only question remaining is who makes the decision.

I suggest the creation of a group called the Small Project Priority Committee (SPPC), comprised of manager-level people from the user departments which are the primary customers of modification and maintenance services. This group considers all work that will take fewer than six man-months or cost less than \$20,000. The representation on this group should cover the spectrum of user departments.

If the small project and maintenance effort is divided into subgroups by application area, then one SPPC is needed to guide each group of analysts and programmers.

Before each SPPC meeting, individual department managers should rank all work requests within their own departments. The purpose of the SPPC meeting is to merge the work request list into a combined priority sequence to give user guidance to the analysts and programmers for their next assignment.

The SPPC normally meets monthly and sets priorities for the next three months. After each meeting, a simple bar chart schedule can be drawn to give visibility on these priorities.

With the implementation of the executive-level group and the SPPC, DP management is completely out of the priority-setting business. Because these two groups also consider the cost benefit desirability of requests for proposed work, DP is also out of the business of having to say "no" to a user when he requests work.

Service Functions

A series of service functions are necessary within systems and programming. To permit the project management process to run smoothly, each of these services is needed by members of the development or maintenance teams at some point in the project life cycle. These services are:

- **Project control administration.** Effective project management systems get many requests each week that require an answer. If no individual is present to give such an answer, then the project management process can get into serious trouble.

A full-time individual is needed for any group that contains more than 40 to 60 analysts and programmers. For smaller organizations, the project control administrator function can be combined with other duties, such as

Step #2: Defining the problem

Step #1

Automation security. It's a large problem in today's business world. And as in any problem solving situation, step #1 is recognizing that you indeed do have a problem. The more we talked to D. P. managers, operation supervisors, V. P.'s, and even presidents—people like yourself—the more we realized just how strongly you were aware of the need for overall security for your automation systems. And how there seemed to be nowhere you could turn for a total, comprehensive, A to Z automation security evaluation... tailored specifically for your installation.

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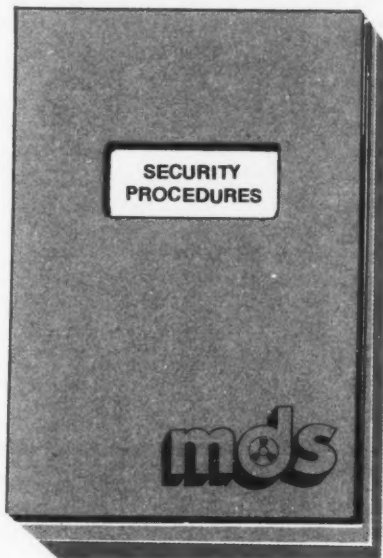
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Modernized; for want of let's say proper automation security, whole companies could literally go under. It not only can happen... it has happened;



does happen, to companies just like yours and to people just like you.

We're not trying to use scare tactics—we're being brutally candid. Because not having a secure system, being covered against eventualities that could put you in a down mode is sort of like playing Russian Roulette... it's just a matter of time, odds, and random chance.

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IN DEPTH

training. It is important that the other assignments given this person be of lesser urgency than the project control function.

- **Data base administration.** An individual is required to review data base matters as projects go through their life cycles. It is also assumed that the data base administrator maintains a central documentation on data elements and similar matters. This function is most effectively performed if it is centralized.

- **Security.** A central place for the audit of control features in newly designed systems and a place where one can get advice on control and security matters is highly desirable. The individual in charge of security should interface very closely with both the internal and external auditors.

- **Operations acceptance.** An individual should be assigned to assist in the systems test and the review of each operation's document to ensure that new systems that are turned over are complete in these regards.

- **Maintenance acceptance.** An individual should be designated to attest to the maintainability of new systems and to certify that a system has been adequately tested so severe maintenance problems will not be encountered.

- **Maintenance change control.** An individual should be given responsibility for examining the testing of JCL and programs and the updating of all required documentation in the operations, maintenance and user areas each time a change is made to the system.

The Master Systems Plan

The systems a company creates are a direct reflection of the business it is in and the role its executive management sees for DP in supporting the business. Without some type of effective plan, the systems development effort lacks emphasis. Whatever development work that does take place tends to be ad hoc, meeting the greatest current pressures brought by individual managers.

In this environment, unserved users often attempt to go outside the company to get their work done. This causes additional aggravation for DP management if standards are to be enforced to ensure effective systems development and to ensure that essential interfaces with existing systems or with future systems are proposed.

The lack of a plan also results in many changes in priorities, with resulting shifts in individual assignments. This normally proves quite wasteful of the systems and programming resources.

When plans are developed, they are often created in a place too distant from the end user and become the DP plan for the organization. But there is an approach that will result in a corporate plan for DP.

From the Top Down

In the development of a plan, the ideal approach is to build on a foundation of the corporate goals and objec-

tives. In many organizations, unfortunately, these goals and objectives have not been clearly and formally spelled out, and it is often necessary to make assumptions regarding the direction in which the organization is headed.

It is also desirable to identify and document DP goals and objectives that support the corporate goals. A long-range strategy for carrying out the company's business can then be developed.

Once the strategy has been developed, it is possible to catalog business functions and to create broad "blueprints" of each application area which identify each major system and the interrelationship of the various systems in that area. If these blueprints are prepared in flow-chart form, each major system would be shown as a single block on the chart, and connectors would identify the relationship between the systems.

This approach can be called a "top-

down" plan because it starts with the management objectives, goes to systems and programming objectives, next to systems blueprints by application and then to the identification of individual systems. It is assumed that a proposal is subsequently prepared for projects to create each of the needed systems.

This development process is similar to the IBM Business Systems Plan. A number of reputable consulting firms (Continued on In Depth/4)

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The console can be any teletype compatible terminal operating at bit rates up to 9600 BPS.



The CMC is a high performance micro-processor directed controller that emulates the IBM 2701 transmission control unit for IBM I, II, III, TTY and SDA II line disciplines. It occupies less than 1.3 cubic feet of space and can replace up to two IBM 3704's or IBM 2701's at a fraction of their combined cost. EIA RS 232-C and wideband interfaces offer high throughput in an extraordinary reliable and compact package.

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IN DEPTH

(Continued from In Depth/3)
have also been using this approach to develop long-range DP plans.

Unfortunately, the process consumes substantial amounts of calendar time and is quite expensive. Largely as a consequence of this and the lack of expertise in this area, very few organizations have a plan in existence or a process to create one or to keep one up to date.

Bottom-Up Plan

To get a plan established in a shorter period of time and to buy time for development of a top-down approach, the bottom-up plan is a real help. This approach starts with a survey of project managers and senior analysts in DP to identify systems that are needed to ease the maintenance or operating problem that exists. The DP staff members are often aware where strong user pressure exists for new or modified systems.

A preliminary list of needed systems prepared by DP should be taken to key user personnel to certify that the systems are actually needed and to solicit requests for additional systems. The next step is the division of listed systems into multiple pieces or combinations of systems that cover the most meaningful scope. Most organizations can develop lists of 20 to 50 systems names by this process.

For such a list, it is desirable to identify the order of magnitude of the required project to create each of the systems. It is suggested that terms such as "massive," "very large," "large," "medium" and "small" be used to identify the level of effort required, rather than trying to attach dollar amounts.

When this is done, any candidate systems that will obviously cost less than \$20,000 or six man-months' worth of systems and programming effort can be segregated. It is suggested that this smaller project work be handled in conjunction with the organization's maintenance and enhancement work.

Project Proposals

With either a top-down or bottom-up approach, the plan is not complete until each project has been investigated, the cost and benefits have been identified and a management judgment has been made about the wisdom of using the organization's resources to create each system. The document that captures the data is called a project proposal.

In addition to describing the desired system, this document displays the benefits (both tangible and intangible) the system's requestor expects and a broad estimate of cost.

The estimate is arrived at by considering the scope of the proposed work and comparing it with cost records of prior projects. To improve the accuracy of the estimating process, it is wise to have it performed by a small group of experienced DP persons rather than a single individual.

Proposal preparation normally takes one to three man-weeks, but it can

take as long as three months. The key task is conducting broad interviews with users on their requirements. This assignment is one of the most difficult for systems analysts to perform because they have been trained to quickly concentrate on comprehensive detail; conducting interviews for only broad functions becomes a challenge. It is significant that design activities not be performed at this highly preliminary level.

Other major tasks required to

produce a proposal are the review of the proposal draft with user management to ensure both its accuracy and their support when it is presented to the management group. User management may then request any needed revisions.

Assembling the Master Plan

Once a series of proposals for each project is complete (six is a desirable number), the priority-setting process can begin.

Although DP management has been doing this by default for years, it should get out of the priority-setting business. The responsibility for this function rightfully belongs in executive management's hands.

Executive management would like to make these decisions if it can be assured it does not have to acquire a substantial technical knowledge of DP to do so. However, as I have already shown, the task can be performed using only conventional business skills.

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IN DEPTH

It is difficult to assign priorities in an absolute manner. Often many of the projects appear to be of equal importance. An easier process that produces a more practical result is to rank the project proposals.

A prerequisite of this process is that each of the proposals be screened by some responsible management person to ensure that the benefits described are sufficient to justify the roughly estimated cost. Once the cost benefit screening is complete, then the rank-

ing process can begin.

The ranking procedure is most easily performed if it takes place in two stages. Stage I results in the proposals being cast into four groups: (1) essential, (2) high priority, (3) low priority and (4) to be done later. A category of average priorities is purposely not chosen because it tends to be a slop bucket in which proposals are placed when decisions cannot be made.

The differentiation between high and low priorities forces the members of

the management group to clarify their feelings about the individual projects. During the initial priority-setting meeting, the casting of the proposals into the four groups can be done quite rapidly.

Stage II combines new proposals with the existing priority list. Once a tentative ranking is accomplished, then the simple exercise of comparing two proposals at a time has proven workable.

For example, suppose there were only

enough money to fund one more project — which of two proposed projects would it be? By starting with the two proposals at the top of the list, the rank sequence can be confirmed or altered. By proceeding through the list, pair by pair, it is a simple and practical matter to place all of the project proposals in rank order.

It has been my experience that the top two categories (essential and high priority) will account for at least a two-year workload for the entire systems and programming staff. It is essential that top management set priorities only on this quantity of projects because a series of additional priority-setting meetings will be held over the two-year period to reassess thinking on the project sequences.

Because the project sizes are in excess of \$20,000, it is recommended that the executive management level group be used for the priority setting. It is necessary for it to meet only quarterly to confirm the sequence of projects previously ranked and merge new project proposals that may have been developed since the last meeting.

Master Plan Schedule

If the level of resources (people in systems and programming for development work) is known or can be assumed, then a milestone schedule can be developed to let the management and users know where each requested system stands. In the identification of the resource level, it is assumed that the individuals working on small projects and maintenance are not included.

A simple milestone schedule is drawn by considering the dollars per month that the project team can accomplish compared to the estimated dollars on the project proposal. No detailed scheduling or work assignments are considered in this broad level of schedule development.

It is also possible to prepare more than one schedule based on different assumed levels of resources in systems and programming. For example, one schedule can be drawn on the assumption that the department will have 30 analysts and programmers available and a second plan can be developed showing the resulting schedule if there were 40 people on the staff.

After the schedule is produced, it is healthy to review the priorities with the management group, making sure the group is comfortable with the time frame for the development of the systems. Often they will reconsider the resource level of the staff in systems and programming in order to shorten the schedule or will agree to farm out work to accelerate the implementation of the needed systems.

Three-Ring Binder

The development of a master systems plan is most conveniently done using a three-ring binder or its equivalent. In the assembly of such a plan, the author considers the following table for contents to be a minimum.

- Background and purpose.

(Continued on In Depth/6)

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IN DEPTH

(Continued from In Depth/5)

- Goals and objectives
- Assumptions.
- Statement of strategy.
- Blueprints by application area.
- Priority lists.
- Schedules.
- Individual project proposals.

It is recommended that the master systems plan start with the bottom-up version and list only the last few sections. As progress is made on the top-down version, materials can be added

to the other sections as they are developed.

To make the plan an integral part of the project management effort, a key policy is mandatory. This policy states that the only way to acquire development funds within the organization is for a requestor to have a project proposal prepared and succeed in getting the proposal ranked as Priority No. 1. When this policy is enforced, then the long-range planning and priority setting process becomes a permanent and

viable part of the project management process.

Without the policy, there springs up by-pass routes for project funding which permits the "squeaky wheel" to get his project work done without taking his request to the priority group. In this environment, the entire priority-setting process can rapidly deteriorate.

Life Cycle Components

In this article I assume the project manager is taking responsibility for

the total project. By the total project, I mean all of the user activities that occur in advance of data entry, all of the DP activities and all of the user activities that occur subsequent to the DP function.

When a project life cycle is built under this assumption, it will normally contain substantially more things to do than if we look upon systems only as existing a few inches to the left or right of the computer.

Each architect of a project life cycle normally chooses the term "phases" and will define two to 15 phases. It has been my practice to refer to only three broad phases as a vehicle to communicate the nature of the work being done as the project progresses through its life cycle.

Phase One is systems definition, where preliminary activities take place to understand what the user requires and to decide upon the broad approach to be pursued in the design of the system. Phase Two covers the design and development activity, and Phase Three is concerned with systems implementation.

An important principle in the assembling of a life cycle is that *all* project work must be defined by a task at the correct point. A second principle is that the life cycle should avoid "looping" or cycling back to redo tasks. It should flow from beginning to end.

In each of the three phases, there are certain tasks associated with the design and development of the system. In Phase One, the project must be organized, review boards set up, detailed user requirements documented, conceptual design developed and an evaluation performed to choose the most appropriate direction.

During Phase Two, a large number of the tasks are associated with defining inputs, outputs, data base activities, system specifications, controls, program design, program specifications, programming and unit testing. During Phase Three, the production of user manuals, training materials, systems tests and similar items are handled.

Administration and Control

The second category of things to do on a project is made up of the administration and control activities. In Phase One there are planning activities to assign and schedule tasks, as well as a series of quality controls at milestone points where a logical amount of work has been done. A re-funding activity should take place at the end of this important phase which involves estimating, scheduling and securing management approval.

In Phase Two, quality control is needed at the end of preliminary design, detail design, program design and unit testing, replanning and recertification of the viability of the systems design from the user's as well as the technical viewpoint. Also, special reviews by the data base administrator, the security specialist and the internal auditors must be built in.

During implementation, the planning of the implementation, the review of

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IN DEPTH

the user manual and quality reviews by maintenance and operations representatives are essential.

The third category of tasks in a life cycle is documentation. Much documentation is a by-product of other activities, but additional tasks are necessary to accomplish the unique documentation that will end up in the operations and maintenance areas.

All of the documentation produced in Phase One is for the purpose of getting the design approach clarified and is normally not maintained after the project is over. Much of the documentation produced in Phase Two becomes a part of the maintainable documentation at the end of the project. In Phase Three, a series of additional tasks are required to bring about the documentation that satisfies the total needs of the end user, the computer operations group and the maintenance activity.

The project life cycle also becomes an ideal vehicle for the training activities of the department. The life cycle clearly displays all of the task work to be performed at each phase of the project.

By comparing the capabilities of each individual with the tasks to be performed in the life cycle, the identification of specific gaps in training is most easily accomplished. Once the gaps are identified, then the selection of appropriate training courses can be made so that the staff becomes qualified to execute the tasks for which it is responsible.

The life cycle can be considered analogous to a clothesline that has on it a series of garments: one for each design, development, administrative and documentation task. The garments are arranged in the sequence of task execution. This arrangement has the further advantage that as systems development or project management techniques change, it is necessary only to take down the out-of-date garments and to put up the new ones.

It is important that the tasks in the life cycle call for only the work that is needed so a project following the tasks will do only the work deemed necessary by the DP management group.

The standard life cycle is assumed to be the starting point for each individual project. When the project manager plans his project, he starts with the standard, prepared life cycle, eliminates the tasks that do not apply and adds the tasks unique to his assignment.

Support Materials

If all projects were the same size, a single life cycle would be all that would be required. However, projects occur in all sizes from maintenance jobs to massive development efforts.

It has been my experience that settling on three life cycles is impractical. The first life cycle contains extensive control checklists for the maintenance function, which might apply to any project less than one man-month.

For projects that fall in the one to six man-months category, a small project life cycle containing a reduced number

of tasks is appropriate, and the full life cycle would be used for all projects larger than six man-months. The complete life cycle is developed first and the other two derived from it.

An additional challenge is to produce guidance materials for the staff. If detailed guidance material is produced for each task, it can be considered threatening by senior members of the staff, who might feel that that much hand-holding is not required. For them, summary descriptions of what

to do and what to produce are all that is required. However, for intermediate and junior staff, more specific guidance is usually appreciated.

Forms-Oriented Documentation

In constructing these support materials, suggest that no task be included in a life cycle unless it can be so described that it produces specific deliverables. The reason for this is that it becomes administratively simpler to define the end of the task as being the

production of all the stated deliverables.

Further, the reviewing process is simplified if preprinted checklists of the needed deliverables are made available to both the reviewers and the people doing the work.

The deliverables most conveniently take the form of documentation. In my experience, form-oriented documentation is a desirable route to follow. The reasons for this are:

(Continued on In Depth/8)

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IN DEPTH

(Continued from In Depth/7)

• The assigner of work can most clearly communicate to those who perform the work what he is asking for if he can give them a brief description of what to do and identify specific forms to be completed.

• It is faster to document information on forms than to start with a blank piece of paper, prepare the rows and columns and then document the data.

• Unnecessary documentation can be eliminated because rules can be set to

stipulate that only the official forms are used.

• Essential information can be guaranteed if the department requires that all mandatory forms be complete.

• It is highly helpful to the persons performing the maintenance function if the documentation they use always appears in the same format.

Each task needs a standard that describes what to do and what documentation to produce. This material need not be wordy because the life cycle is

responsible only for controlling the sequence and format of the deliverables. Including teaching materials in the standard makes the materials bulky and difficult to use on a day-to-day basis. An example of a well-executed deliverable is highly desirable because it quickly communicates the level of detail being requested.

A standardized documentation repository for each of the projects in the department should be created. The repository should contain a series of pre-

printed tab dividers that identify all the specific deliverables produced on the project. All documentation produced is placed behind the appropriate divider.

The project manager (or any other manager) can quickly determine where the project stands by examining the contents of the repository. Where the repository stands is where the project stands. This simple concept has proved to be extremely useful.

When an audit of the conformance to the standards is performed, the mechanics of the comparison is very straightforward because the repository and the standards manuals use the same dividers. In summary, a project life cycle needs the following characteristics:

• All tasks to be performed must be included: design, development, administrative, control and documentation.

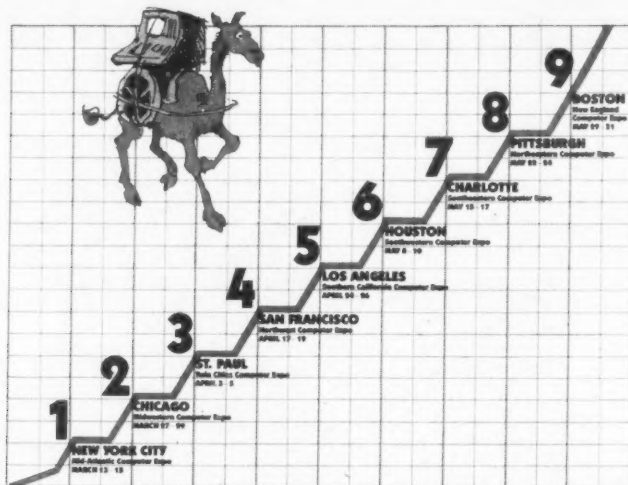
• Each task must produce deliverables; forms orientation provides benefits.

• Three life cycles are needed: large, small and maintenance.

• Detailed guidance material is essential.

The life cycle becomes the foundation for all other project activities such as estimating, planning, technical efficiency, user involvement and operations turnover.

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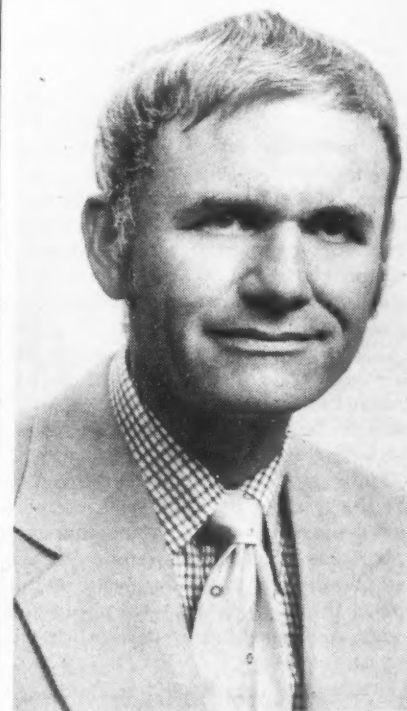
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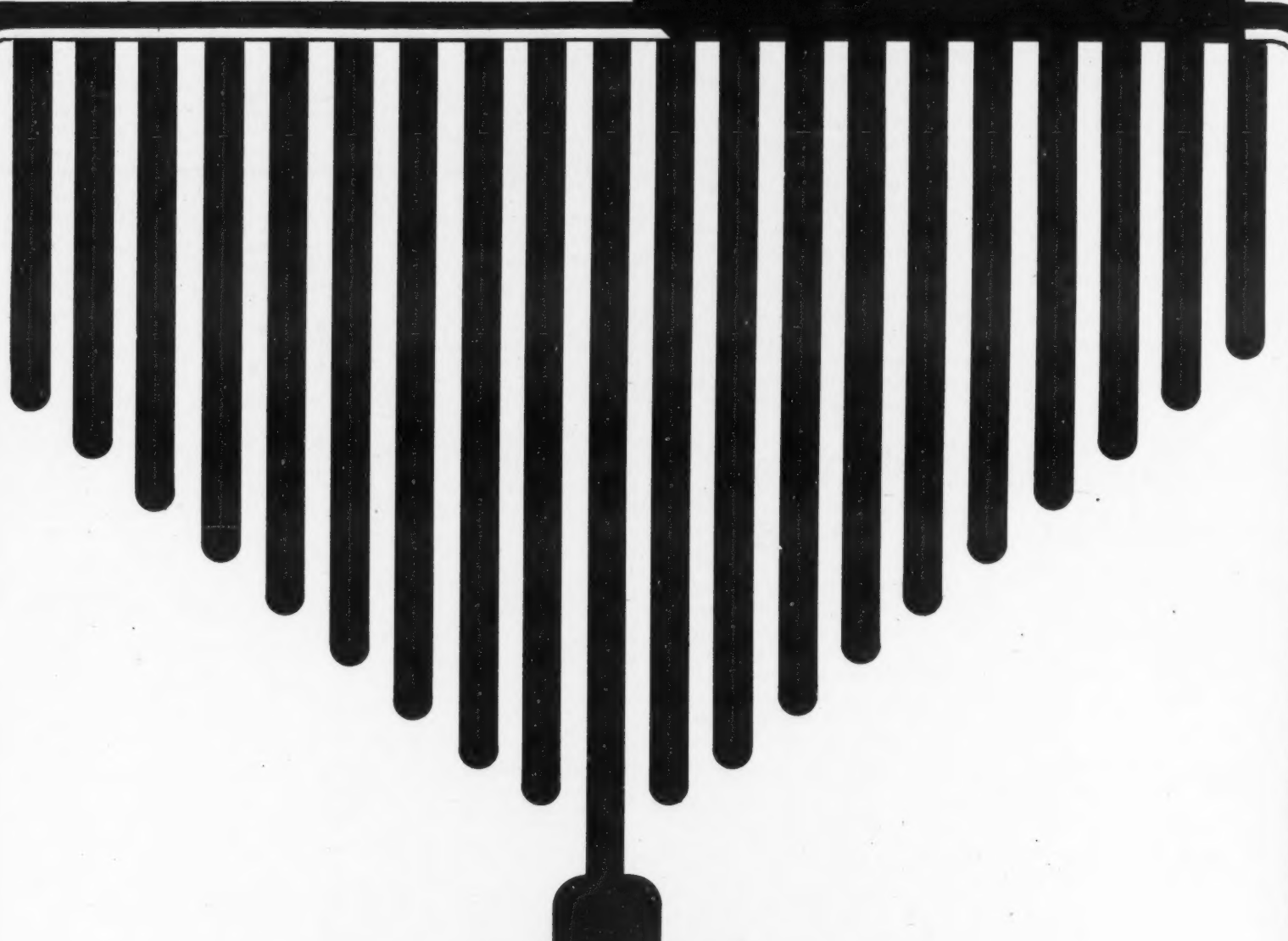


John D. Toellner is president of Spectrum International, Inc., formerly known as J. Toellner & Associates, the developer and marketer of the Spectrum project development system.

Toellner has 27 years of industrial experience; the last 15 years have been spent in DP-related consulting.

The author holds a B.S. in mechanical engineering from the University of California at Berkeley and did two years of graduate study in operations research and computers.

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November 27, 1978

Edited by Ronald A. Frank

Independent of Host's Architecture

Dutch Bank to Start Up X.25-Based Private Net

By Leo P. van der Toorn

Special to CW

AMSTELVEEN, Netherlands — One of the world's first private X.25-based networks will come into service in the Netherlands at the end of this year. It was designed by Philips Teleprocessing to meet specifications formulated by the Amsterdam-Rotterdam Bank N.V. (Amro).

The high-speed packet-switching network utilizes Comsys, a flexible, application-independent hardware/software package based on the Philips DS-714 Mark III switching system. Both batch information and interactive inquiry/response traffic will be accommodated by the network, which is expected to handle a daily load of more than one million messages by 1982.

The recording and exchange of information are obviously fundamental to the banking business, and the importance of these functions increases as more stress is placed on diversity of domestic and international services.

The demand for up-to-date management information at all levels continues to rise steadily, as does the volume of information interchange with clearing houses, organizations such as Swift and so on.

In the Amro case, the automation of payment traffic activities in widely dispersed offices throughout the country led in the early 1970s to the creation of office service centers at which cus-

tomers' transfer orders are collected and the information input via data entry equipment, to a main DP center in Amstelveen, near Amsterdam, where virtually all processing is done.

In order to cope with projected increases in this type of traffic, to meet data communications needs associated with other activities and to provide the infrastructure for future applications, the bank elected two years ago to install a full-service private data network.

Special Significance

Apart from a number of special features, some of which are discussed below, the network has a rather special significance because it is an example of a major DP user installing a large data communications network which is entirely independent of the host system architecture.

Comsys uses procedures and protocols which conform to internationally accepted CCITT standards and are compatible with virtually any configuration of host and terminal facilities. The network is therefore open-ended and can grow and change as new terminal equipment is developed and as public data networks evolve.

Technological developments in hardware or software can be applied to the network structure as they become available, without influence on the DP

(Continued on Page S/15)

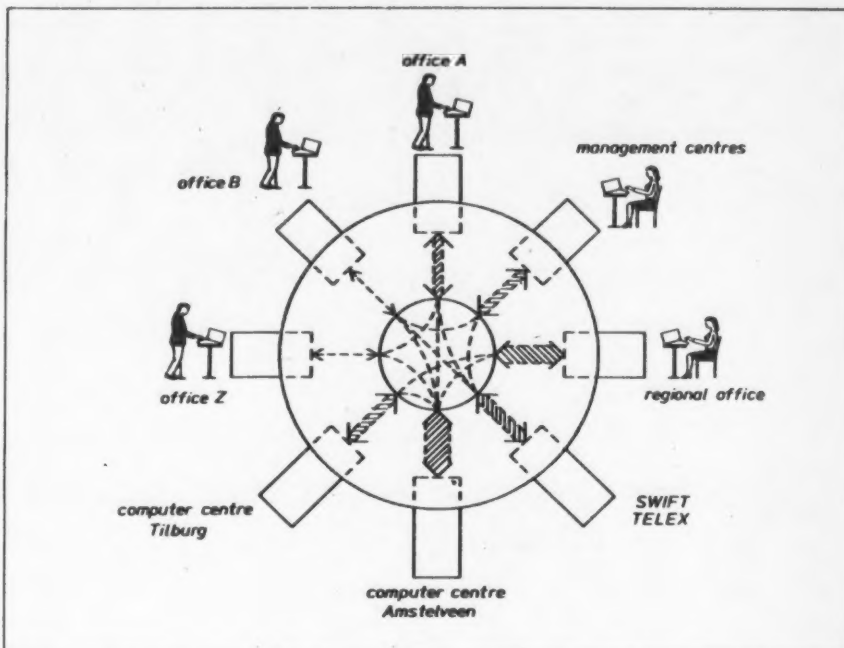


Figure 1. Data flows between sources and systems in the Amro banking network.

Packet-Switched Network Designed for APL Users

By Roger D. Moore

Special to CW

The I.P. Sharp Associates Ltd. (IPSA) APL network began operation in the summer of 1969 with a system that contained one time-division multiplexer (TDM) and 60 dial ports. By early 1976, this had grown into a medium-sized collection of TDMs, including one transatlantic link. During 1976 and 1977, this network was replaced by a packet-switched network.

The primary goal of the network, both before and after the change, has been the provision of APL service to remote low-speed terminals.

The network is not particularly obvious to the user. Initial connection is kept as simple as possible. With a single input, the user can identify both terminal type and destination APL machine. If the requested APL facility is available, user interaction with the network ends.

After the connection has been established, the network acts as a simple forwarding agent: output from APL is passed to the terminal for printing, and input from the keyboard is passed to APL.

Unlike certain public networks, this net has no provision for escape to the network during a session. The closest approach to this is the network recognition of XON/XOFF when the terminal is not in the "input to APL" mode. These control characters allow the terminal to control the rate at which output is sent from APL to the terminal.

The network requires a certain amount of information about the

user's terminal for terminal control and for printing legible error messages. The APL/360 trick of examining the initial right parenthesis to resolve BCD vs. Correspondence has been retained. This character was chosen on the grounds that many people would accidentally type it during a sign-on attempt and the information required by the network would be acquired.

The initial right parenthesis from an Ascii terminal is not actually used by the network. It is retained briefly so that an obfuscatory blot can be elicited from APL after a connection has been

(Continued on Page S/20)

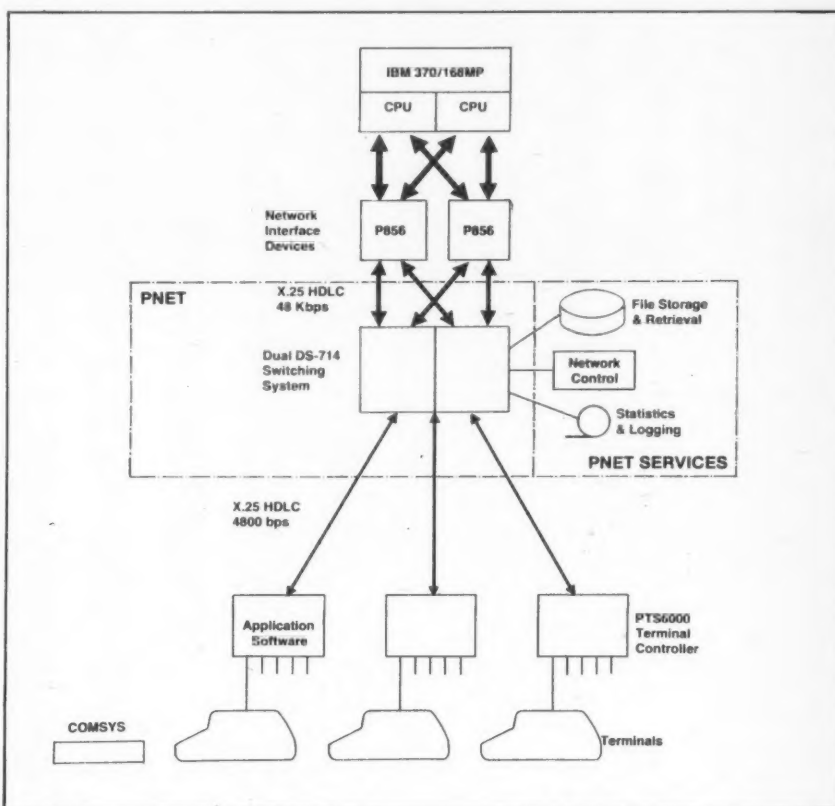


Figure 2. General Arrangement of the Amro Network

On the Inside

Dutch Bank to Start Up X.25-Based Private Net.....	S/2
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Net Helps French Bank Grow Easily.....	S/3
Users Cautious, But Many Will Go SNA Route.....	S/4
Network Allows 150 Universities to Share DP-Based Resources.....	S/6
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Net Helps French Bank Grow Easily

By Kathi Bylander
Special to CW

PARIS — A dispersed data communications network is a vital part of the daily operations of Societe Generale, a prominent French bank headquartered here.

By early 1971, Societe Generale had a teleprocessing system encompassing 700 terminals that served the provincial branches and were linked to the central mainframes by a single line.

Despite the quality and extent of the services rendered, however, the system was unable to satisfy the requirements of a bank with 2,600 branches, 35,000 employees and four million accounts throughout France.

Societe Generale had two main DP centers at that time — one near Paris and the other in Aix-en-Provence, just north of Marseilles — and all input from the branches came to these two centers each working night.

After the processing was performed, the reports and other documents were returned to the branches before 8 a.m. via trains, buses, delivery people on motor bikes and so on.

Needs Assessed

In 1972, the bank began studying what the next generation of DP system should be. Transaction volume was growing rapidly and it was clear that the existing system would be operating near capacity by 1978. In fact, it was projected that by 1980, transaction volume would reach 100 transactions per second.

Bank management called in SG2, its computer consulting subsidiary, to redesign the old system. SG2 formed a team of engineers and programmers and went to work.

By 1973, bank management agreed that Societe Generale should aim for a distributed system; by the fall of 1975, it had begun testing.

Two group processors and 50 terminals, plus testing equipment, were installed. Conversion of the first test group and four branches began in October 1975 and was completed about five weeks later. The result was a limited version of the type of operation described here.

Previously, files were account-oriented. If a customer had several accounts, the files had one record for each account. But in the new system, data is customer-oriented. All accounts for the same customer are linked together for on-line query and sequential batch processing.

In all, a three-year schedule was laid out for converting branches and regions to the new system. It is planned that all nodes of the distributed system will be in operation by 1980.

Societe Generale expects that its distributed system will grow with the workload, adjusting to increases in transaction volume and allowing flexibility for opening new branches and regions.

Administrative Core Retained

The teleprocessing system designed by SG2 retained Societe Generale's ex-

(Continued on Page 5/28)

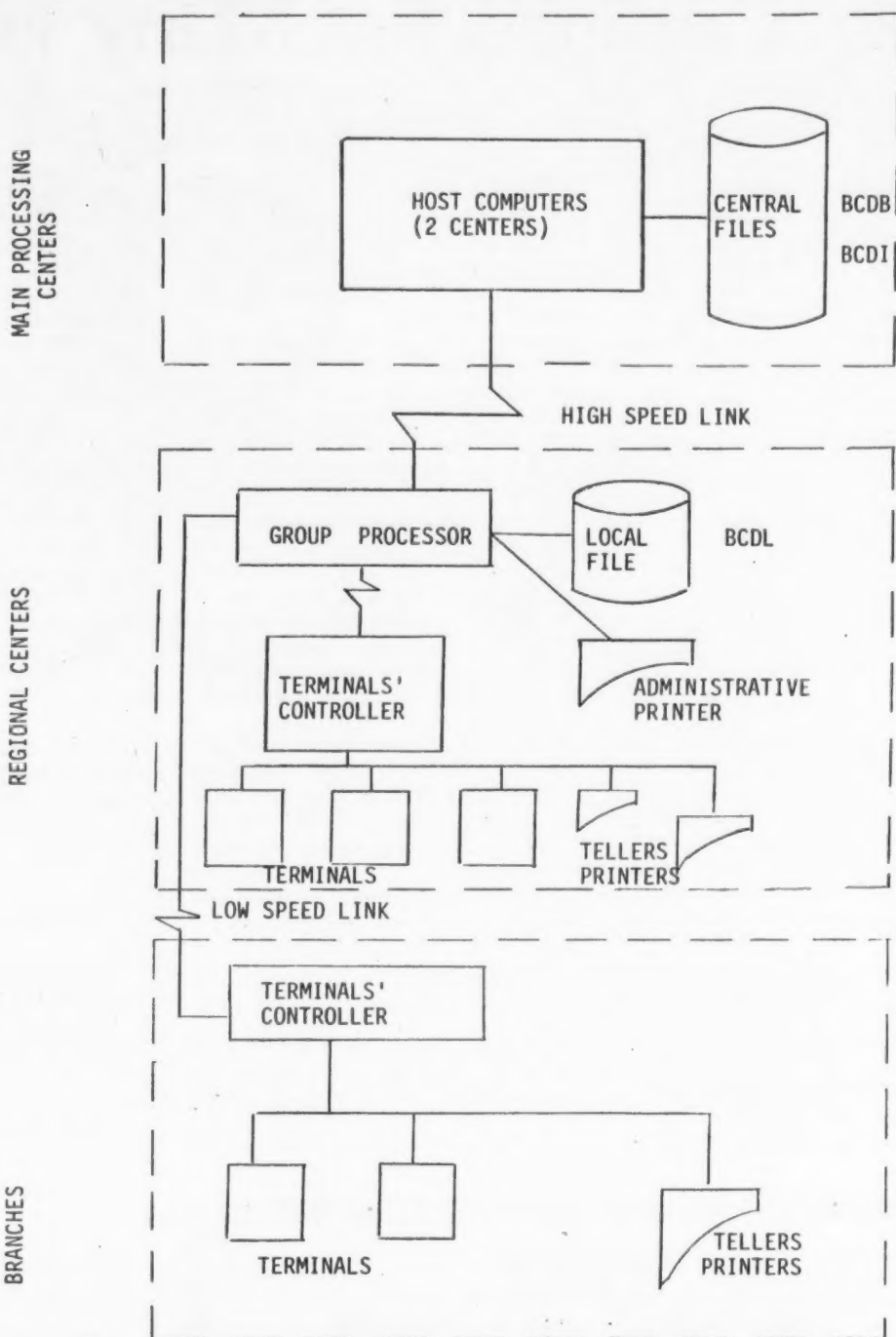


Figure 1. Network (RTA) Scheme of Societe Generale

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Users Cautious, But Many Will Go SNA Route

By John Gantz
Special to CW

WALTHAM, Mass. — Four years ago, IBM pulled together some then-new terminal offerings and a new, barely understood line protocol called Synchronous Data Link Control (SDLC) and announced its Systems Network Architecture (SNA). It thus loosed a cascade of networking acronyms for IBM and other computer and communications vendors that is still inundating the user.

Prior to SNA, IBM's offerings in data communications were a hodgepodge of incompatible hardware and software products. In the decade before SNA, IBM had developed more than 200 communications products, 35 teleprocessing access methods in the host and 15 line protocols.

SNA is IBM's attempt to impose coherence on that tangle, to straighten the compatibility snarls.

Slow in Short Range

But the proposed beneficiaries of the SNA blueprint — the users — have been slow to wed their short-range plans, at least, with IBM's. SNA does not come cheaply, and it requires a commitment to IBM products and philosophy. For the last several years, it has seemed that the marriage of users to SNA has been a troubled one.

Because of a lack of orderly industry statistics on SNA — rumors were rampant that SNA was a total flop — International Data Corp.'s (IDC) *Distributed Processing Newsletter* recently conducted a survey of IBM users to ascertain their plans regarding SNA.

Is SNA a flop? Well, it hasn't been an

overnight success. Perhaps IBM didn't intend it to be. The concept itself is intricate and difficult to assimilate and implementation can be complex.

SNA development has been evolutionary — one building block at a time — and a critical mass of SNA hardware and software products probably has not been reached yet. SNA also has some drawbacks:

- System processing overhead can be costly. One public utility saw the number of transactions/sec on its 370/158 Model 3 drop by three to 11.1 under OS/VS1/Vtvm over DOS/EXTM.

- Memory overhead can be excessive. A small SNA network with SDLC and the Virtual Telecommunications Access Method Vtvm can easily eat up 1M byte of virtual memory and 200K to 300K bytes of real memory.

- SDLC's seven-frames-in-transit protocol can increase the efficient use of communications lines, but imbalances between inbound and outbound traffic can reduce that efficiency.

- Training for operations and programming staff requires significant outlays and follow-on salary increases.

According to the users, SNA's major weakness is in its software, with Vtvm the especial bugaboo — some described it as unstable. Another problem was that IBM salesmen and field service force weren't checked out on SNA in the beginning.

Users Speak

The IDC survey touched base with 241 IBM installations, more large users than small. In all, the sample represented 3% of the IBM 370s and 370/50s or 65s (6% by value of sys-

tems installed). More than 15% of the 370/168s and 8% of the 370/158s were accounted for.

The respondents reported more than 50,000 terminals in their networks as of December 1977 and said they would have 70,000 by December 1979. About 30% of those were IBM 3270s.

The questions asked of the users included system configuration as of December 1977 and that expected by December 1979, amount of SDLC use, experience with SNA and evaluation of SNA. Some of the basic findings were:

- Forty out of 241 sites were SNA users, 17 had 370/168s or 165s as the senior system on hand and 14 had 370/158s or 155s.

- Forty-eight more said they would be SNA sites by December 1979: 17 with 370/168 or 165 senior systems, 25 with 370/158 or 155 senior systems. Forty-six more said they would switch to SNA in the "foreseeable future."

- The most popular justification for implementation was better network throughput, but better hardware per-

formance and savings in communications costs were also frequently mentioned.

- The most prevalent reason for rejecting SNA was lack of proven savings. Almost one-third said it required too much memory. One-fifth of the respondents didn't want Vtvm.

- Of the 50,000 terminals represented, 4% currently had SDLC. By December 1979, the SDLC percentage will be 16% according to the survey (See Figure 1).

Comments from users in the survey revealed a wary "what's-in-it-for-me" attitude. Those who have switched to the IBM blueprint have done so for the performance improvements more than the cost savings; those who haven't aren't going to move off the dime until the economics are there.

Polishing the Lure

But IBM is changing the equation of those economics.

First, the Armonk mainframer is lowering the entrance requirements to SNA. Early on, the company an-

(Continued on Page 5/8)

SNA Applications	Number of Mentions For Current	Number For Future
Inquiry Response	16	21
Sales Order Entry	11	11
Inventory Control	9	12
36XX Applications	7	7

SNA Expectations	Yes	No	No Reply
Did SNA Meet Them?	22	7	11
	(55%)	(17%)	(28%)
			(Too early to tell)

Conversion Problems

	None	Training	Hardware	Software
Number of Mentions	8	14	12	18
Percent of Mentions	15%	27%	23%	35%

Reasons for Migration	Number of Mentions	Percent Of Mentions
Better network throughput	26	41%
Better prices/newer hardware	22	35%
New applications/easy to go SNA	8	12%
New applications/SNA worked best	7	12%

Reasons for Rejection	Number Of Mentions	Percent Of Mentions
No Proven Savings	62	21%
Memory Overhead	52	18%
Vtvm	39	14%
SNA Hardware	27	9%
Stick With Bisynch	25	9%
MVS	21	7%
IBM Marketing Practices	19	7%
Want PCM terminals	16	5%
Don't want central network	14	5%
Don't understand it	14	5%

TOTAL MENTIONS	291	100%
(172 responding sites)		

Figure 1. User Responses

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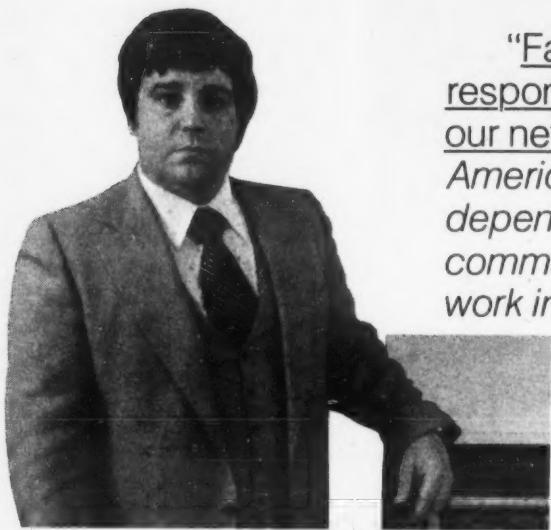
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American Fabrics' network better by eliminating mainframe polling. Response times dropped from 20 seconds to five seconds on the satellite link because CRTs in Los Angeles transmit only data to the mainframe — not ACKs and NAKs.

"SDLC doubled our transmission rate." Parent said easy implementation of SDLC via Paradyne's PIX II also made his network better, by providing simultaneous two-way transmission and improving response times for remote printers.

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Network Permits 150 Universities to Share

By Paul S. Heller
Special to CW

PRINCETON, N.J. — Edunet is a national service network established to facilitate the sharing of computer-based resources among institutions of higher education and research [CW, Nov. 28, 1977].

Operated as a special activity of Educom, a nonprofit organization located here, Edunet provides services that permit

the large community of users to identify and apply specialized resources to meet their diverse DP needs in instruction and research.

Individuals on user campuses work with members of the Edunet central staff to access one or more of the host CPUs at 15 educational institutions that serve as Edunet suppliers. The connection between the user terminal and the host CPU is generally pro-

vided by a value-added communications network such as the packet-switched service offered by Telenet Communications Corp.

A facilitating network, a relatively new concept, differs from most networks in that the net itself does not own or operate a CPU or any data communications facilities. Rather, the underlying premise is that many desirable and often unique services already

exist but are known only to a small, local group of users.

By making such services known and remotely accessible, a facilitating network can increase the options available to faculty and students and expand the community of users for those institutions that agree to supply services.

Few facilitating networks exist on a national scale, and those that do tend to be single-purpose. For instance, the

Health Education Network (HEN) facilitates access to resources in the health sciences. Cache, another nonprofit organization, makes specialized packages available for instruction in chemical engineering.

General-Purpose Net

Edunet is the only general-purpose national facilitating network. Begun as a prototype activity initially sponsored by 22 major universities, Edunet provides members of the higher educational community with the option of selecting among DP resources ranging from interactive statistical packages and analytical research tools to advanced computer-assisted instructional (CAI) materials in virtually every college discipline.

For instance, more than 18 law schools, including those at Harvard University and American University, are currently using CAI programs in law based at the University of Minnesota. These materials, developed by two leading legal scholars, are recognized as among the finest such aids in legal education.

In addition, two schools of library science and education in North Carolina are using Wise — an information storage and retrieval system developed at the University of Wisconsin that is suited to bibliographic data bases. They are using Wise to train their students in on-line search and retrieval techniques.

Without Edunet, these and many other computing resources would be unavailable because of the costly, time-consuming and sometimes technically infeasible process of transporting software to a local facility.

Uses Value-Added Networks

While Edunet makes the human connections, collects and disseminates resource information, handles accounts and provides remote user support, it has looked to the communications services offered by the value-added networks for the physical connection between Edunet users and suppliers.

Most Edunet suppliers have a dedicated host connection to the Telenet network. Two suppliers are also connected to Tymnet, Inc. The 13 Edunet suppliers and their hardware facilities connected to Telenet and/or Tymnet include:

- Cornell University (IBM 370/168).
- Dartmouth College (Honeywell Inc. 66/40).
- MIT (Honeywell 6180, IBM 370/168).
- Merit Computer Network: University of Michigan (Amdahl Corp. 470V/6), Michigan State University (Control Data Corp. CDC 6500) and Wayne State University (Amdahl 470V/6, IBM 370/67).



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DP-Based Instruction and Research Resources

- University of Minnesota (CDC 6400).
- State University of New York at Albany (Univac 1110).
- University of North Carolina (two IBM 370/165s).
- Rice University (IBM 370/-155).
- Stanford University (IBM 370/168).
- University of Wisconsin (Univac 1110).
- Yale University (IBM 370/158).

The two other Edunet suppliers currently accessible via long-distance dial-up connection are the University of Illinois at Urbana with a CDC Cyber 175 and the University of Notre Dame with an IBM 370/168.

For access to Edunet suppliers connected to Telenet, users in more than 150 locations in North America need only make a local call and issue a command to select the desired Edunet host CPU.

Several schools, including Cornell, Stanford, and those that participate in the North Carolina Educational Computing Service, need not even make a local call, since the local terminal network has a direct user access port connected to Telenet.

Billing Procedure

Generally, Edunet suppliers are billed directly by the value-added carriers for the fixed cost of the dedicated host connection and for the variable usage costs, which in the case of public dial access to Telenet is \$3.25/hour plus a small volume-based packet charge.

The rebilling strategies of Edunet suppliers vary, but in most cases a communications surcharge is added to the normal charge in order to recover costs. The full communications costs are typically between \$4/hour and \$7/hour when public dial access is used (and less for those schools that have direct user access ports).

This compares favorably with an average communications cost of a direct dial-up call of more than \$20/hour.

The low cost of the value-added data communications services has substantially enhanced the economic viability of Edunet. However, cost savings is not the only benefit provided by the value-added carriers.

The conversion of otherwise incompatible transmission codes and formats makes it possible for almost any user terminal, regardless of make or model, to access the systems of Edunet suppliers.

Faculty, students and others in the academic and research community are able to find out about Edunet products of interest to them in one of two ways.

One important channel is through the information dissemination activities of the Edunet staff and campus liaison. One-page supplier fact sheets provide summary information on hardware and software resources of Edunet suppliers. The *Edunet News*, a quarterly publication with a circulation of 10,000, keeps its readers abreast of current Edunet offerings.

In addition, an on-line cata-

log containing abstracts and other information on more than 500 programs offered by Edunet suppliers is maintained in the Edunet resources data base that can be searched for key words under the Spires system at Stanford University.

Use Via 'Hotline'

The second means of locating Edunet resources is through user inquiries outlin-

ing specific needs or seeking specific programs. Such users are encouraged to make requests via a toll-free Edunet Hotline.

In response to these need requests, the staff combines data base searches, "broadcasts" via Telemail (an electronic message system at the University of Wisconsin) and *Edunet News* "Want Ads" in an effort to locate appropriate resources.

Once resources are identified through either of these means, individual accounts with the appropriate Edunet suppliers are centrally assigned.

Upon use, the account holders are billed directly by the suppliers for computer and communications costs. Currently more than 100 accounts at more than 60 user institutions have been established in this manner.

Heller is director of Edunet.

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SNA Acceptance to Grow Despite Uncertainty

(Continued from Page S/4)

nounced support for previously SDLC-only terminals under bisynch protocols and the TCAM access method.

Later, in 1976, the company announced a multisystem networking scheme, increasing the architecture's attractiveness to the big networkers.

More recently, the Series/1 was al-

lowed into the SNA fold.

Finally, just last month, the company announced the 8100 information system as an SNA product — yet it supports non-SDLC protocols and terminals, including the 2740.

Hardware Offerings

A second way in which the equation is being rebalanced in favor of SNA is

through IBM's related hardware offerings, specifically the 30 Series processors.

The overwhelming demand for the new systems is common industry knowledge, but according to a recent Guide (IBM users group) survey, many large-scale commercial IBM users are also switching to MVS — primarily to take advantage of the 30 Se-

ries hardware.

Once MVS is installed for reasons independent of network blueprints, it becomes easier to justify a conversion to SNA. Another building block has been winched into place.

Acceptance Predictions

By combining the results of the IDC users survey with IDC's forecasts about the 370/30 Series population through the rest of the decade, some predictions can be made for SNA acceptance:

- 1978 and 1979 will be watershed years as SNA site population rises past 1,000 this year and approaches 2,000 next year. The number of sites will nearly double each year.

- By 1981, almost one-fourth of all SNA-eligible sites (370s, 30 Series CPUs on hand) will be running at least one SNA network. By dollar value of SNA-eligible systems on hand, that represents 45% of that SNA-eligible base.

- By the end of this year, more than 10% of the installed base of 3270s, excluding plug-compatible manufacturers' (PCM) terminals, will be running under SDLC. By 1981 that number will rise to 30%.

Again we ask: is SNA a flop? Put it this way. It was, but it isn't likely to remain so for long. Now that the 8100 has pried open the SNA window a bit — allowing the blueprint to encompass more old terminals and protocols — and the 30 Series CPUs have begun shipment, there is more impetus for conversion. SNA is more attractive (or less unattractive, depending on how you look at it).

On the Road

There are still some uncertainties, of course. AT&T's Advanced Communications Service (ACS) could put a damper on the migration to SNA simply because the older IBM terminals will be supported. But ACS won't hit its "salad days" until the mid-1980s and beyond. By then, SNA will be established — and perhaps its working definition changed — such that ACS will no longer be a threat to the IBM blueprint.

The move to international data communications standards, especially X.25, could retard conversion to a network architecture that didn't support them.

On the other hand, while IBM may be forced to include interconnection to public nets running under standard protocols (witness IBM's X.25 adapters for Transpac and Datapac), it may do so without gutting the entire SNA concept, at least not for a long, long while.

Block by block, kilobyte by kilobyte, selectable unit by selectable unit, IBM's Grand Design will be carried out. All roads lead to SNA. Those roads not leading there will ultimately become the ones "less traveled by," but the users are ambling, not racing on their way.

The survey mentioned is part of the report "SNA and the User: A Troubled Marriage?" published by IDC. Copies may be obtained for \$95 from IDC, 214 Third Ave., Waltham, Mass. 02154.

Gantz is editorial director and editor of IDC's Distributed Processing Newsletter.

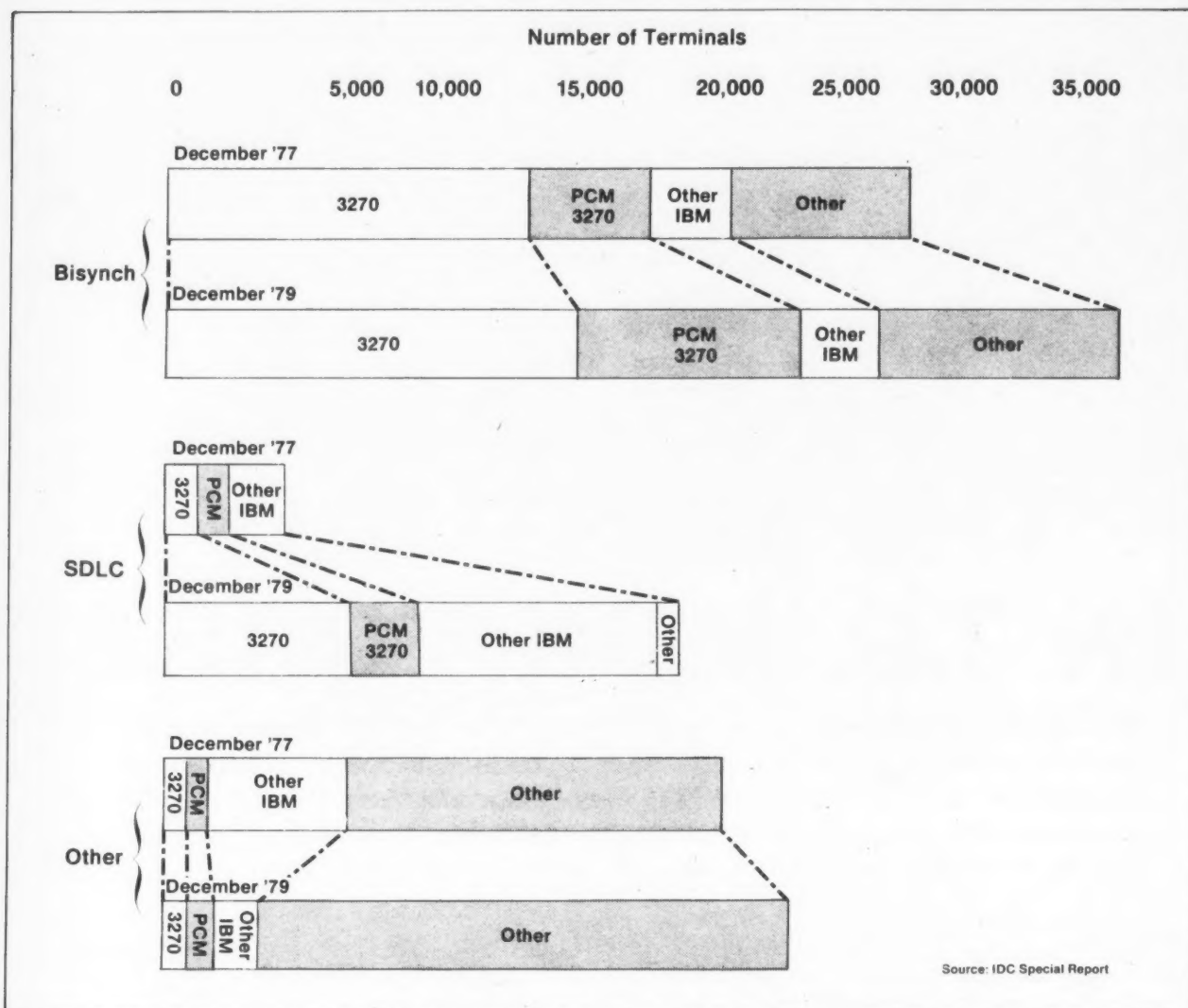
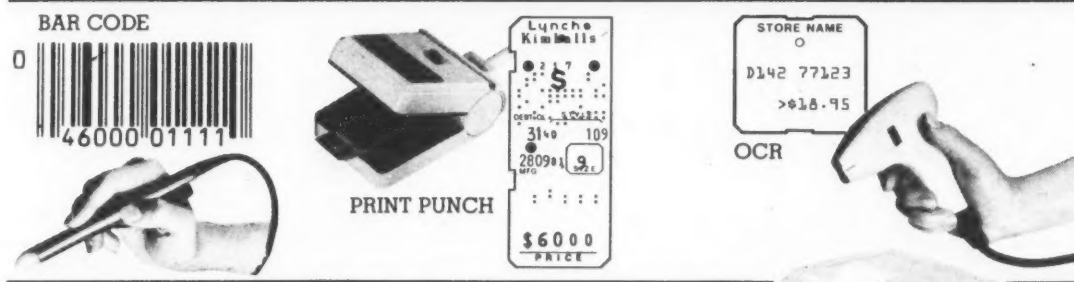


Figure 2. Terminal Growth by Protocol

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Network Helps Chrysler Dealers Accelerate Vehicle Repair Process

CENTER LINE, Mich. — Chrysler Corp. and its service and parts dealers have reported increased customer satisfaction with vehicle repairs since it installed a computerized parts order system. The on-line system, called the Mopar Parts Connection, currently links nearly 1,000 participating dealers' parts departments directly to Chrysler's central mainframe here with a communications network.

The "Connection" provides up-to-the-minute status for

Tymcom recognizes the caller as a Chrysler dealer who wishes to communicate with the Detroit parts CPU. The connection is made and the mainframe signals that it is ready to receive input.

Thereafter, dealer service personnel are in direct communication with the system from their printing terminal stations, cutting out middle-

man functions and reducing errors to near zero.

Before the existence of the Mopar Parts Connection, dealers placed customer vehicle repair parts orders in one of two ways, both of which generated costly phone bills and were considerably more time consuming:

- A dealer could place a call
- (Continued on Page 5/11)



The computer can match an order to the right part even if an outdated part number is used.



Loren Bertran, parts manager at Van Ness Chrysler-Plymouth-Dodge in San Francisco, inputs a parts order to Mopar.

any of 150,000 parts ordered by dealers through any of Chrysler's 19 regional parts depots across the country, enabling Chrysler service managers to schedule work and assure customers vehicle repair on a predictable schedule.

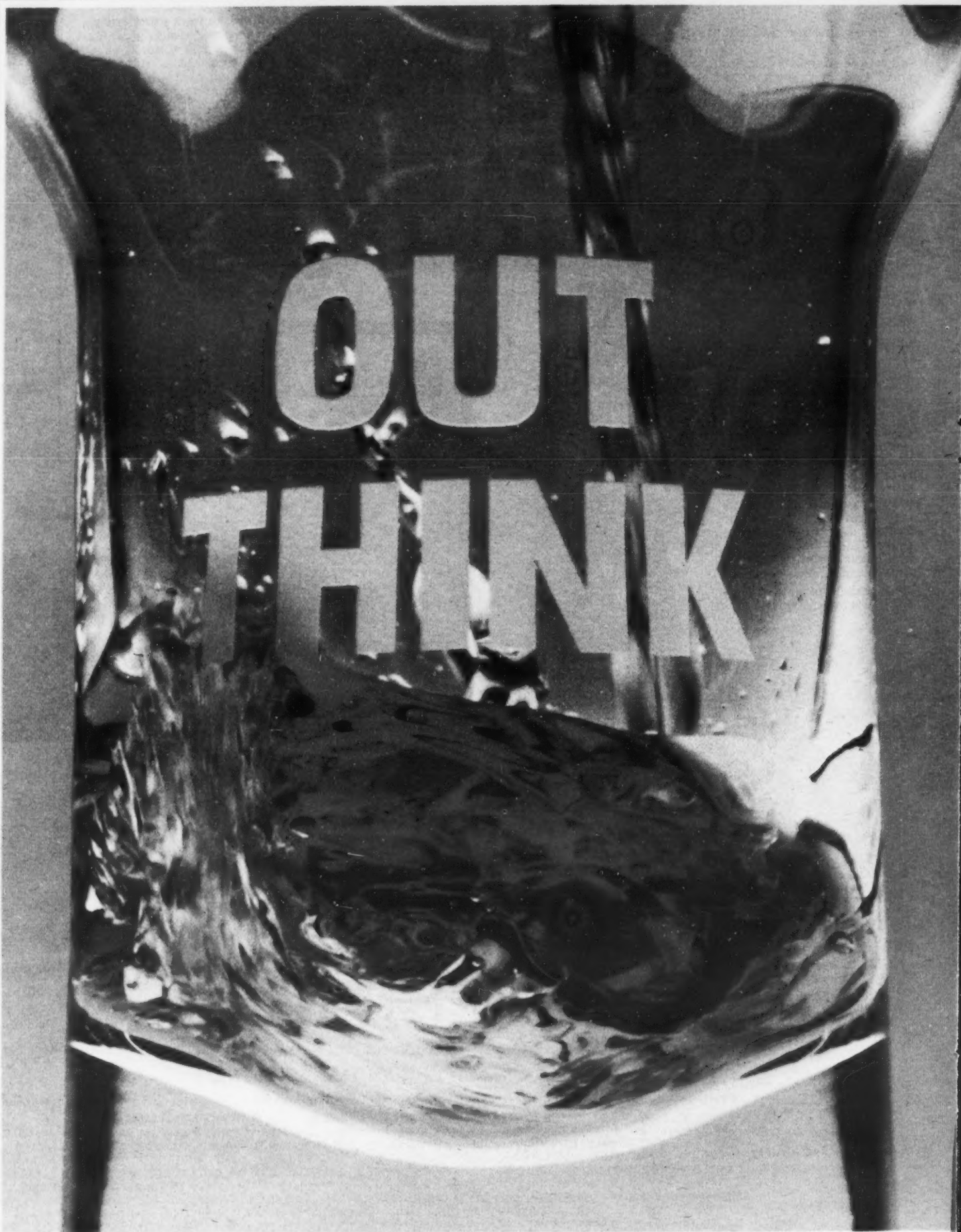
The Mopar Parts Connection is made through Tymnet, the public packet network operated by Tymnet, Inc. A local phone call to the nearby network node connects the dealer to the parts data base on Chrysler's twin Amdahl Corp. 470V/6 computers here in Center Line.

Tymnet provides local telephone access to dealers in some 135 domestic access cities, while Chrysler provides Wats lines for dealers located outside of major metropolitan areas serviced by local Tymnet nodes.

Participating dealers lease an Alanthus Corp. 30 char./sec teleprinter, a wide-carriage terminal that provides a direct link to the Center Line mainframes.

Reaching Chrysler's Detroit-area parts CPU is an uncomplicated procedure. A special telephone number reaches a Tymnet communications processor (Tymcom) in a "node" city. The Tymcom functions more or less like a traffic controller to route calls of many subscribers over the public packet network.

In a matter of seconds, the



Parts Order System Speeds Chrysler Repairs

(Continued from Page S/10)
and leave a message through a code-a-phone, an electronic answering/recording device that prompts the caller for his requirements. This method was used for nearly half of Chrysler's parts orders.

- For special-handling orders, which account for about 3% of Chrysler's orders, dealers placed long distance phone calls to an expeditor at the nearest of the 19 parts de-

pots. The expeditor would then transmit orders on-line and make inquiries of the central mainframe.

Now, dealers using the Mopar Parts Connection access the computer directly and get fast response. They can determine from which of the 19 depots a part will be shipped, how the shipment will be made and when the item will arrive. They also can check status on earlier orders.

Ralph Davis, assistant parts manager at Clyde C. Netzeley, Inc., a Plymouth-Chrysler dealer in the Chicago area, likes the speed and simplicity of the network. "It takes only a minute or two to establish connection with the Detroit computer, and the codes we have had to learn aren't all that complicated or numerous," he said.

Davis and his co-workers, who use the Mopar Parts Con-

nection computer up to 10 times a day, estimate they save more than an hour a day over the old method.

A key feature of the computerized system is the ability to update parts numbers. There are some 150,000 different parts in the data base, and single part's number can change up to five or six times in several years. The "Connection" will take an old number keyed into the system by a dealer and

automatically update it, saving the dealer the time often spent looking up the latest part number.

One of the system's most valuable attributes is that it provides any dealer with the ability to check the status of an order at any time from depot to dealership. He can determine the date of shipment, the depot from which it was sent, the transportation service used and the bill of lading number. The dealer can continue to track the shipment until its arrival.

When a dealer places an order, the specific items are com-

Liquids, the most adaptable of all matter, shape themselves exactly to fit their containers.

In much the same way, a Datapoint ARC™ system adapts itself to fit the needs of a business.

In this day when competitive edges are frequently slight and often difficult to come by, you have to out-think your competition to gain an advantage. The Attached Resource Computer system can help by putting powerful data processing capability at the hands of those who need it most, wherever they are in the company.

Not just another network

An Attached Resource Computer system is an arbitrary number of small, powerful, inexpensive computers, each performing its assigned tasks independently, yet all are totally interconnected to share common resources and draw from a common database. For high reliability, the system is composed of proven Datapoint processors and peripherals.

One of the ARC system's strengths is its specialization of components. One or more processor in each system is dedicated to file processing and management. The others are applications processors. Internal communications are achieved by an Interprocessor Bus, using dedicated Resource Interface Modules (RIMs).

This capability frees a computer from juggling all three functions. Consequently, processing can be carried out at much higher throughput. Even though the processors are functionally dispersed, the system is a single, unified computing facility, with the processing speed and capability of a large, conventional computer.

Solves growth problems

This new, modular architecture offers easy-to-implement solutions to the problems of system planning and growth. The system manager can add (or delete) processors or file storage as workloads change.

Expansion can occur in modular, incremental steps, at predictable, affordable costs. Only enough processing power is required at a given time to accomplish the immediate

workload. Important capital is not tied up in costly overcapacity, yet the work is not delayed by a bogged-down, overworked computer.

Protects software investment

The ARC system can use your present Datapoint system software. When additions are made to the system, current software is not affected. All the Datapoint resources suitable for participation in an ARC system are completely compatible.

While direct hardware cost comparisons are difficult because of differences in architecture, our studies indicate that the cost of an ARC system may be only 50% to 70% of the cost of a more conventional system with equivalent capabilities.

Total adaptability

The applications at work in an ARC system can be as varied as the diverse functions of the business environment. The concept applies to any type of firm engaged in one or multiple endeavors. Its usefulness is equal whether it's in a corporate home office,

a division headquarters, or a remote office. Or all three can simultaneously employ their own ARC or other Datapoint systems and interconnect them through telecommunications links.

A nationwide support network

There are more than 500 Datapoint Customer Service Representatives in the field, stationed in over 130 local service area offices. The system is designed to place customer service and support as near as possible to Datapoint's 11,000 installations.

Write for more information

A Datapoint Attached Resource Computer system is the ideal solution to your business data processing needs. Datapoint has to out-think its competition. The ARC system puts us another big jump ahead.

A booklet describing the features and advantages of the ARC system is available by writing to Datapoint Corporation, Marketing Communications Dept. (M62), 9725 Datapoint Drive, San Antonio, TX 78284. Or call the Datapoint sales office nearest you.

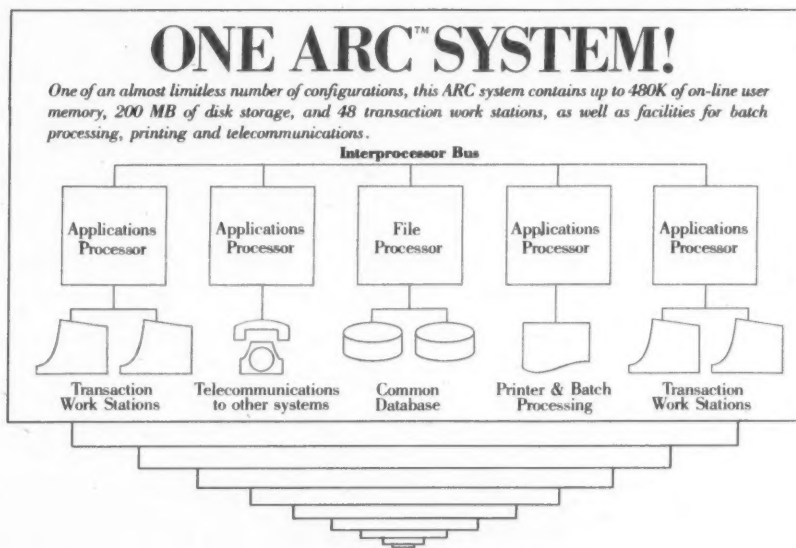


Bertran cross-checks Chrysler parts received against the terminal printout produced when he initially ordered the items.

mitted to him, inventory levels are automatically adjusted and the part is ordered from the nearest depot.

"Knowing which of the 19 parts depots the part is being shipped from is a special advantage," observed Loren Bertran, parts manager of Van Ness Chrysler Sales and Service Corp., San Francisco. "Our service people can be reasonably accurate when notifying a customer, in most cases, the day and hour his vehicle can be repaired. It's helpful for us and convenient for the customer."

An added feature provided by the system-to-dealer parts specialists is the hard-copy printout of all transactions. The printout is not only valuable as a permanent record, but also can be used to guard against errors or make revisions to orders.



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Service Reduces U.S.-UK Transmission Costs

By Barry D. Wessler

Special to Computerworld

The first transatlantic link in an emerging worldwide system of interconnecting public data networks went into operation this fall between the U.S. and the UK.

The International Packet Switching Service (IPSS) enables users on both sides of the Atlantic to send low-, medium- and high-speed data at costs that are related to volume and substantially lower than any other means of data communications.

IPSS is being offered jointly by the British Post Office (BPO), the three major U.S. international record carriers (IRC) and the Telenet Communications Corp. and Tymnet, Inc. packet networks in the U.S. Telenet has supplied the packet-switching equipment and software being used at both the BPO and the IRC gateways.

IPSS replaces the BPO's Data Base Access Service, which was limited to low-speed dial-up access from the UK to U.S. systems. In contrast, the new service is bidirectional. IPSS gives UK users access to data bases and remote computing systems in the U.S., and users in the U.S. access to similar resources in the UK.

For the first time, overseas packet communications can be used for synchronous applications. Currently, computers or intelligent terminals using the CCITT X.25 protocol can communicate over the IPSS link at synchronous speeds up to 9,600 bit/sec.

Typical of the initial users of overseas packet communications service is The Information Bank, a subsidiary of *The New York Times*. Like many computer-based data banks, The Information Bank had not pursued the European market before because of what it considered prohibitive communications costs.

In 1977, when 300 bit/sec dial-up access to the U.S. became available, the firm opened a sales office in London and now has 40 to 50 clients in the UK and on the continent. The addition of 1,200 bit/sec dial-up access will make such data base services even more attractive to UK users, since it will lower total communications costs.

Among companies looking at IPSS for synchronous applications such as computer-to-computer file transfer is Prime Computer, Inc. Prime sees IPSS as a more timely means of keeping track of production scheduling and sharing program files between its R & D groups at corporate headquarters in Framingham, Mass., and Bedford, England.

Economics Of IPSS

The users who are likely to benefit the most from IPSS are those who need to transmit less than 500 hours of low-speed data per month or less than 100 hours of higher speed data per month.

For lower speed applications, 1,200 bit/sec or lower, the best previous alternatives were Telex at \$153/hour and Datel at \$108/hour.

For medium-to high-speed transmission, international leased channels are an economical alternative for only the very largest multinational companies that can justify the cost of \$9,090/mo for a dedicated line.

The actual cost of an alternate voice/-

data (AVD) channel between London and the U.S. is well over \$10,000 when all the associated costs are taken into consideration.

In contrast, IPSS rates average \$22/hour for 300 bit/sec service and \$24/hour for 1,200 bit/sec service, including connection time and traffic charges. For batch transmission at 2,400 bit/sec, usage charges are expected to average \$110/hour, and for 4,800 bit/sec, \$210/hour. These charges are the same regardless of the user's location in the continental U.S.

Perhaps the most exciting feature of the service is its ability to handle synchronous inquiry/response terminals of the type widely used within the U.S. for order entry applications.

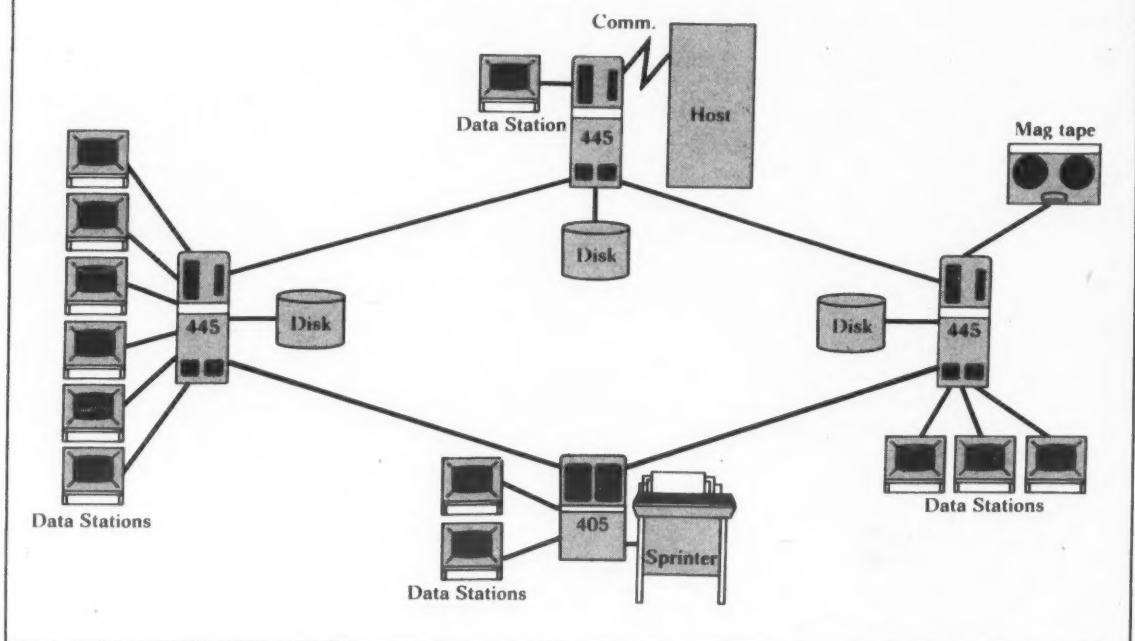
(Continued on Page S/13)

	Speed	Cost
International Leased Channel	2,400 to 9,600 bit/sec	\$9,090/mo
Telephone	Voice grade	\$108/hour (\$81 off peak)
Telex	50 bit/sec	\$153/hour
Datel	1,200 bit/sec	\$108/hour
IPSS/Telenet	300 bit/sec	\$22/hour
	1,200 bit/sec	\$24/hour
	2,400 bit/sec	\$110/hour
	4,800 bit/sec	\$210/hour

Rate Comparison for U.S.-UK Communications

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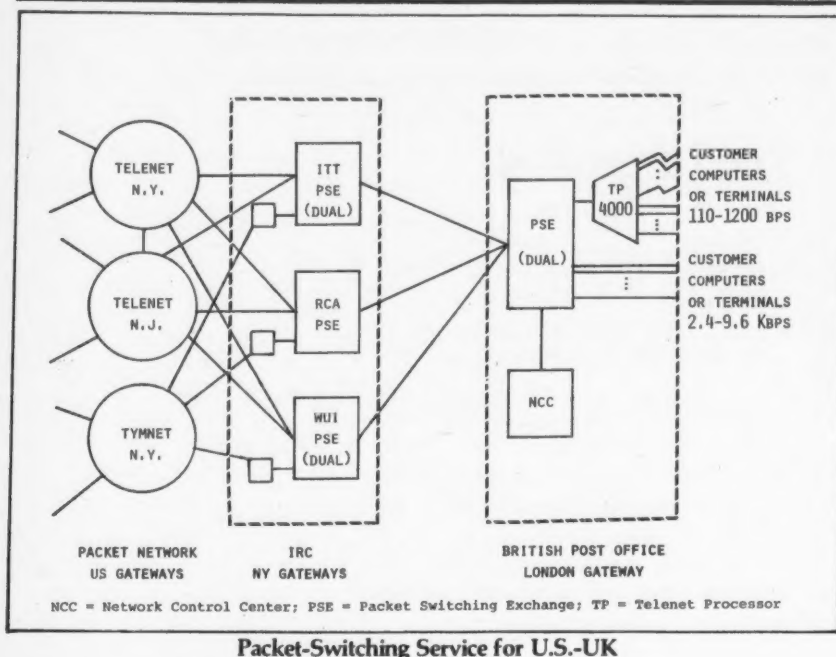
Put the power of your network at every work station.

With Sycorlink, every system in the network

can be tailored to handle the processing tasks of individual departments. And at the same time give authorized users in any department the power to access the files and peripherals of every other system in the network.

A user at any work station can access any file on any disk in the network. At the push of a key. Any file on any disk can be printed on any printer in the network. Any file can be transmitted to the host.

Any system in the network can process data from any file on any disk located at any other node in the network. And a system can be dropped out for maintenance or service



Expanded Network Service Cuts Transmission Costs

(Continued from Page S/12)

Raytheon Data Systems Co. already has an X.25-compatible cluster controller system that can be used over packet networks. Called Raypac, this system operates in conjunction with IBM 360s and 370s and provides users with the functional equivalent of IBM 3270 terminals.

In this example, the host end interfaces to the packet network through Dmep, a software package for IBM 3704/3705 communications controllers.

The economics of IPSS make it very attractive for U.S. companies to extend order entry and other synchronous inquiry/response applications to Eu-

rope.

The total cost of the service works out to approximately \$4,700/mo, less than half the cost of an overseas leased channel. Of that amount, the user will pay about \$1,600 for holding time, \$2,400 for traffic charges and \$700 for the local port and access line at the UK end.

System Facilities

In order to broaden its overseas packet communications services, the BPO has installed a fully redundant packet switching node and network control center, similar to the equipment developed and used by Telenet in its domestic network.

The minicomputer-based processor is used to switch traffic and to concentrate synchronous traffic from subscriber computers and intelligent terminals. Asynchronous dial-up and dedicated lines from subscriber terminal terminate in the processor.

The IPSS network control center, a minicomputer-based system, provides the BPO with downline loading of software, centrally controlled remote diagnostics, continuous monitoring of network operational status and collection of statistical and accounting data.

Cable facilities operating at 9,600 bit/-sec link the BPO packet-switching exchange (PSE) with similar facilities in New York, operated by ITT World Communications, RCA Global Communications and Western Union International.

Each of these three separate overseas routes is backed up with standby lines in case of cable failure.

The BPO currently interconnects with the U.S. IRCs using an enhanced X.25 protocol. The CCITT X.75 protocol for network-to-network transmission is expected to be implemented during 1979.

At the U.S. end, the record carriers connect into the Telenet and Tymnet packet networks for nationwide distribution of data.

The Telenet network is doubly connected to each IRC at network switching centers in New York and Newark, N.J. This dual gateway configuration permits alternate routing of data along the fastest route available at any given moment.

International connections with the Tymnet network are made in New York through a gateway located at each IRC packet switching exchange.

In deciding whether to use IPSS, an important consideration for users is the level of service quality that IPSS and packet networks in general provide.

With redundancy built into each individual component of the service, no failure of any one subcomponent can affect service.

In addition, the packet-switching exchanges perform error checking and retransmission of data and thus compensate for the high error rate often associated with international transmission facilities.

Users should be looking at IPSS as a prototype for the way in which overseas data communications will soon be handled throughout the world.

Wessler is a vice-president of Telenet Communications Corp., Vienna, Va.

you and conquer.

without disrupting the flow of data to and from any other node.

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The Sycor 405 and 445 distributed processing systems can be mixed and matched in a Sycorlink network to create individual processing nodes with just the right amount of power for a specific department or location.

And while each node may be individually configured, it can access the files of another node just about as fast as its own files. Communicating this fast within the network allows nodes to share expensive peripherals, such as a line printer. So any way you put it together, your Sycorlink network has the performance capability that can get your job done. The way you want it done.

This means you never have to overequip any location, paying for power you don't need. Your first step in building your distributed processing network is the right one—with nothing to trip you up down the road.

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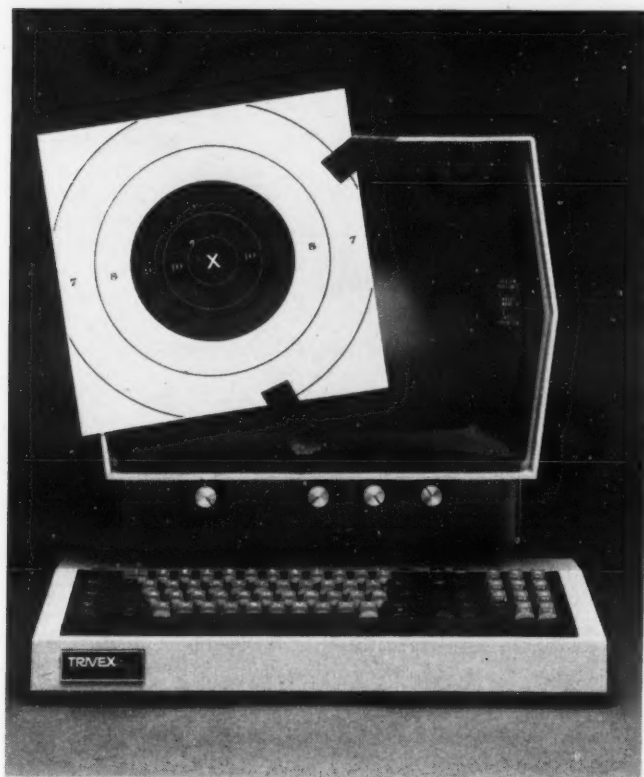
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Well, that's precisely where our Trivex Target Test comes in. Check it out. In about 60 seconds you'll know whether or not you should give Trivex a call.

The Target Test

	CHECK ONE	YES	NO
1. Does a single device failure take your complete cluster off line?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Does a single device failure take your complete channel down?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Will remote communication speeds, switch selectable, up to 19.2KBS improve your network efficiency?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Do your programmers need more information displayed to efficiently develop and debug software?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Are there one or more special functions you need to make your job a lot easier?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Results:

Score 20 points for every "yes" answer. If you scored 20 points or below, you've got nothing to complain about. Don't change a thing.

If you scored 40 points, you may not make the switch yet, but an inquiry is in order.

If you scored 60 points, call us and ask for application information.

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Don't Replace Your 3270s Without Taking The Trivex Target Test.

Dutch Bank to Start Up X.25-Based Network

(Continued from Page 5/2)

activity. As shown in Figure 1, there are no constraints on the directions of message routing, and the network allows processing and distribution in locations other than the existing Amstelveen and Tilburg DP centers, as well as backup processing by one or the other of these two centers.

Although long-term operational experience with Comsys is yet to be gained, Amro has a great deal of confidence in the basic concept of such a flexible, general-purpose network, even in the light of networking developments that have occurred during the two years since the project's inception.

General Structure

Figure 2 shows the general structure of the Amro network in its initial configuration. The dual-processor DS714, located in the DP center, controls the network and provides all the network services. The host mainframe, an IBM 370/168 multiprocessor system utilizing IMS, is linked to the network via Philips P856 minicomputers equipped with special channel adapter hardware.

The hardware/software characteristics of the channel interface emulate two standard 370 subsystems, one for each direction of transmission. This permits full-duplex operation at channel speed and ensures that any foreseeable traffic volume can be accommodated. The channel connection has no influence on the operation of the host system; standard IBM interfaces are employed.

The network interface devices are functionally part of the host system, which is connected to the network as a normal subscriber in accordance with X.25 procedures.

In addition to the data-link handling software that controls the connections to the DS-714, the network interface devices contain one element of a special access protocol which applies to the high-speed exchange of information with the host system. Called Philips Channel Access Method 1 (Pcam 1), this element corresponds to a Philips Network Access Method 1 (Pnam 1) element in the host processor; together they control the link between the host processor and the X.25 network interface.

Other Pcam/Pnam protocols will be used with different host processors; they are independent of other Comsys components and can be replaced without affecting the remainder of the network architecture.

The Comsys software in the host system includes the elements required for message transport, as well as message management software which controls the interface with the application programs in the 370.

The relationship between the Comsys functions and the application software is such that absolute message accountability is guaranteed. No data can be lost, either implicitly or explicitly, without notification to the originator, and no data can be multiplied through retransmission.

Terminal Subsystems

The terminal subsystems used in the district offices are Philips PTS6000 transaction terminal systems. Each of the initial 75 terminals can control up to 24 devices, which may be connected locally or via leased telephone lines.

The back-office terminals used in the Amro network are CRT units and entry keyboards, and a wide variety of other types of PTS banking terminals may be incorporated for front-office use.

The network architecture provides a great deal of flexibility in terms of future growth and addition of new services. If justified by line-cost reductions, concentrators may be added to the packet-switching network to reduce the number of physical circuits to the switching node. The network may be connected to others (such as Swift, the international banking network) via suitable interface facilities.

Using a Telex concentrator, connections may be made from the net to the public Telex network. Additional host

processor connections may also be made, initially to the existing DS-714 and possibly to new switching nodes, transforming the packet-switching net from a star network to a grid configuration.

User Facilities

The Comsys network is more than a pure transmission and switching facility; it is an intelligent network that provides Amro with a wide range of communications processing services, including data storage and retrieval, logging and statistics facilities, broadcast message distribution and centralized network control. Assumption of many of the network management and control functions by Comsys relieves the host CPU and terminal facilities of

these tasks and improves overall system efficiency.

Generally speaking, business data communications networks must provide services to two types of users — line users, the programming personnel who make use of the network to carry out the overall DP function; and staff users, who are the technical personnel responsible for the operation of the network itself.

In addition to its normal data transfer function, Comsys provides a comprehensive range of facilities and services to both these groups. The term "subscriber" as used here denotes an application process. There will always be such a process between the physical user (a person at a terminal) and Com-

(Continued on Page 5/18)



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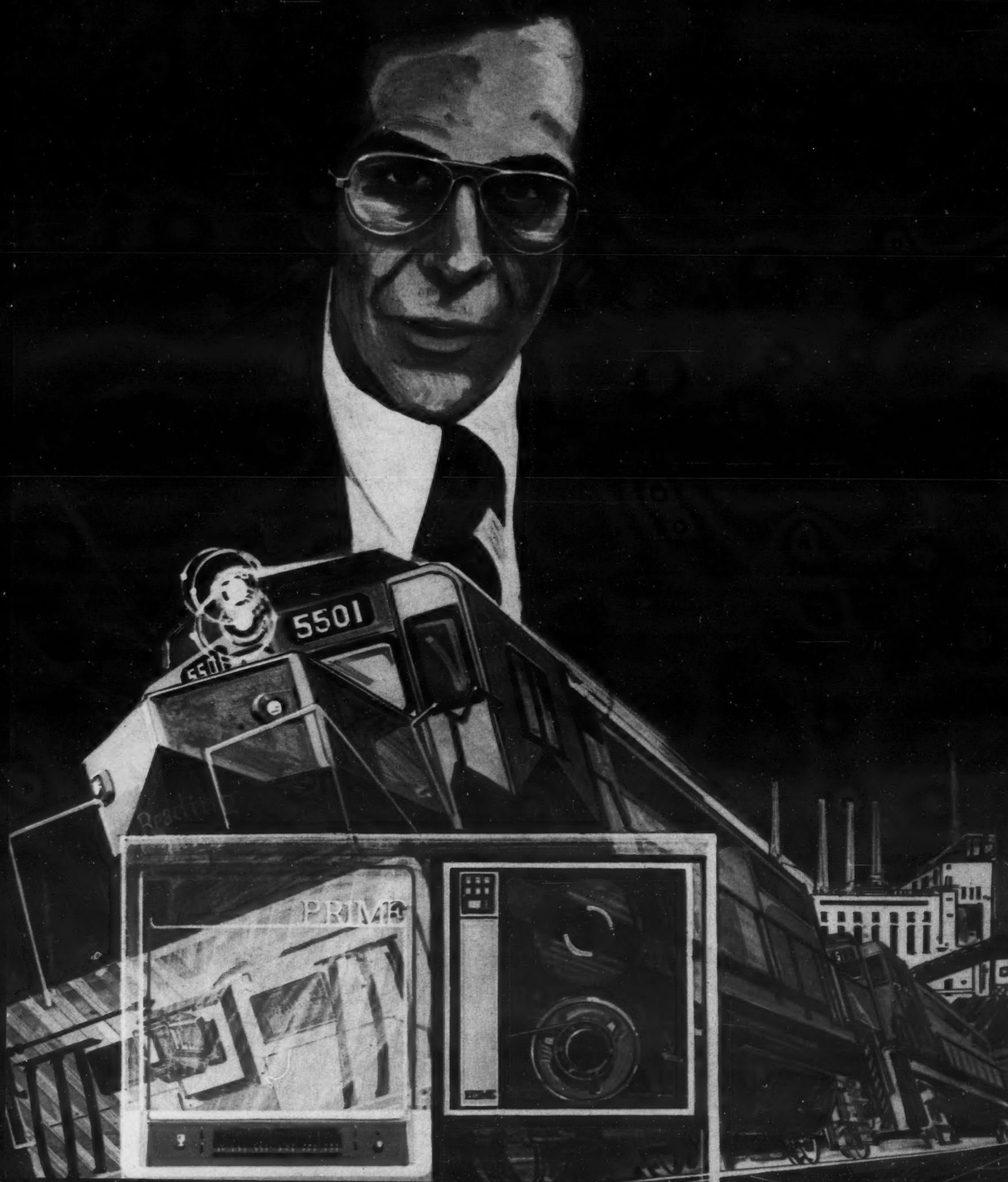


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Hugh W. Stewart, Vice President, Consulting Services Division, Day & Zimmermann, Inc., Ph



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PRIME Computer

"Prime is helping"



Netherlands Bank Starting Up Private Network

(Continued from Page 5/15)

sys; the facilities described are available to the application programmer, who determines whether and to what extent they will be visible at the terminal.

The line-user facilities include message transfer, file storage and retrieval, logging and statistics and service communication.

Message-Transfer Facilities

The message-transfer facilities include two alternative methods: transfer via a normal message circuit, in which case the originating and terminating subscribers are the only users of the virtual circuit while the connection exists; and transfer via a dedicated circuit shared by a number of subscribers.

In general, Amro uses normal message circuits for both bulk data transport and interactive traffic, but the free-flowing dedicated circuit may possibly have advantages in future inquiry/response situations, particularly when a public packet-switching network is used in conjunction with Comsys.

All Comsys subscribers have symbolic addresses unique to the system. These are logical addresses connected to specific application processes and are internally related by the system to the physical addresses involved.

The advantage of this technique is that application programs need not be changed in the event of a network reconfiguration or if an application is moved from one part of the system to another. The user thus has the flexibility to activate applications in the devices that are best suited to handle them at any given time or, even more important, to transfer applications from one host or device to another in the case of a failure.

The information to be transported over a message circuit is offered by the originating application program to the Comsys message-handling software in variable-size message segments, with the number and size of the segments determined entirely by the application program. The segment size may be different at the two ends of the circuit, and subscribers may communicate on an unrestricted basis with no concern for the characteristics of the underlying network.

This method has some important advantages: it allows subscribers to exchange messages without setting a maximum message length, permits changes in packet size without influence on application programs and provides an end-to-end guarantee of error-free message transport (such a guarantee is not provided by conventional X.25-protocol packet-switching networks.)

Automatic Code Conversion

Since two communicating subscribers may be application programs running in hardware that makes use of different character codes, Comsys provides automatic code conversion capability. Of course, fully transparent data transport with no conversion is possible also (with binary files and so on).

A number of priority classes may be defined within Comsys; the technique used to establish the priority of a data exchange permits network control per-

sonnel to control the sessions without affecting the application programs. The use of priority assignment in conjunction with the flow-control facilities available gives the network great elasticity — traffic peaks can be flattened while retaining adequate response times for high-priority traffic.

One of the most important features provided by Comsys is the capability of storing and retrieving batches of information which cannot, or need not, be delivered immediately to their destination(s). The possibility of time-independent communications between processes has a number of advantages for both line and staff users and is of particular value when: the destination is not available at the time the originator wishes to transmit; the batch must

be transmitted more than once, to different destinations; or the batch must be kept in fail-safe storage for a certain period of time.

Batch Manipulation

In addition to the storage and retrieval functions themselves, Comsys permits the manipulation of batches by means of such facilities as invalidation, destination change, status display and so on.

Comsys provides both line and staff users with a variety of possibilities for the collection of statistical information and the logging of both statistics and messages. Examples of such possibilities for the application programmer include counter logging, event logging and the logging of messages consid-

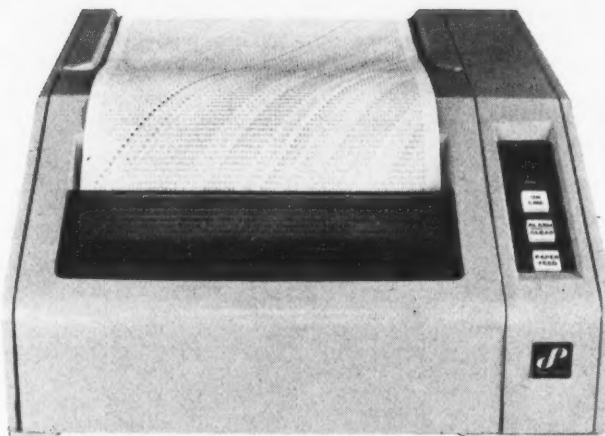
ered sufficiently important to warrant retention.

The system provides an operational interface for the exchange of messages between a line user and the central Comsys operator. An application can send a message to the Comsys operator at the central control location — this may be a request for guidance or assistance from a terminal operator or an alarm message on which immediate action should be taken. The Comsys operator may then send a message from the control position to all, or a selection of, the Comsys subscribers.

In addition to conversations between line users and the central operator, this broadcast facility can be used for such purposes as automatically informing

(Continued on Page 5/27)

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Integrated Network Helps Firm To Yearly Savings of \$600,000

DENVILLE, N.J. — On the third workday of the month, Jim Cotting, vice-president and controller of International Paper Co. (ID), gets worldwide earnings information. On the sixth day, he has a complete directors' statement of operations for the preceding month.

That's not bad for a \$3.67-billion multinational corporation that at one time was almost completely decentralized.

That three-day business close — down from as much as 17 workdays — is partially the

result of the company's integrated teleprocessing network.

Part of a centralization effort started in 1973, the net links 213 locations in the U.S. and abroad with regional IBM 370s in New Jersey and Alabama.

Supported by IBM's Systems Network Architecture (SNA) concept, the network literally makes IP a single company from a data communications standpoint — simplifying all connections between systems, terminals and transmission lines.

The network uses AT&T private lines, operates at speeds from 300- to 56K bit/sec and uses Codex modems at 4,800- and 9,600 bit/sec.

In addition to the accelerated financial close, the network has yielded an annual savings of \$595,000, tightened control of transportation movements and provided a vehicle for on-line order entry of pulp and paper products.

Installed in 1977 after 23 independent data centers were consolidated into two regional data centers, it has even helped move some computing power back to remote locations through distributed processing.

James Mayer, corporate manager of technical development, commented, "In the past, too many projects to improve the flow of information at IP were complicated by technical constraints, particularly in data communications. The network has removed those technical barriers to achieving business objectives."

On Their Own

Those constraints were real enough. In 1973, IP was organized along functional lines, decentralized in DP with 23 data centers and 26 mainframes. Each major location had its own system uses and its own equipment, and there was almost no exchange of information between sites.

"We were truly decentralized, with little effective control," Mayer said. "Each location was basically on its own. Limitations of teleprocessing prevented any real integration of computer functions. Each application included its own communications support."

"To enhance the application — or interface it with similar work at another location — required a change of application software and teleprocessing support, which was usually too costly."

"In addition, the only companywide facility for reporting to headquarters was a teletypewriter network used for message switching. It was an antiquated, unsophisticated,

paper-tape-oriented operation wholly unsuited to our needs," he recalled.

Harry Baer, corporate director of information systems, added, "A lot of the developed software was personality-dependent, home-grown, patched and modified. Nobody really knew exactly what was out there."

Move Toward Centralization

In 1976, IP reorganized along the lines of its business units such as packaging products, pulp, paper and oil and gas and minerals. "Our information systems were developed to support a functional organization. When the organization oriented around lines of business, it became apparent that we needed a better means of distributing information on a timely basis throughout the company," Baer explained.

That better way came in two stages:

- The first was a centralization of computing resources to an IBM 370/168 here and two 370/158s in Mobile, Ala.

Baer's corporate management information system (CMIS) department at IP headquarters in New York City planned and coordinated the changes, providing consolidated computing resources to the corporate staff and 79 IP facilities in the U.S.

- The second stage was network implementation. "When we consolidated hardware, we knew there would still be difficulty moving data to and from locations," Baer said.

"We had about 17 people in pure maintenance providing interfaces to remote locations. The company still had mainly single-application terminal types, with no common, standardized teleprocessing software. We needed an integrated teleprocessing network."

Jim Mayer noted, "In addition, the pressure was on to add new applications such as on-line order entry and production scheduling. It was difficult to meet those demands for new systems and worry about getting information to existing locations at the same time."

After evaluating a number of alternatives, IP opted for IBM's SNA to support the network. SNA is basically common teleprocessing software, a simplification of all the technical considerations facing a data communications user.

With SNA, all data transfer concerns such as line protocol, access method and even choice of most economical transmission are "transparent" to the user. For IP, this meant an IBM 3270 display station at

(Continued on Page S/26)



James Mayer and Nilsa Lopez at IBM 3270 in Operations.

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Packet-Switched Network Provides APL Service

(Continued from Page S/2)
established. It is also used as the left character of the destination selection command. The Ascii character set issue is largely avoided by the absence of special characters in messages from the network.

Former Technique

Prior to the installation of the present packet-switched network, IPSA used older technology to accomplish a similar function. Some of the deficiencies of the TDM technology hastened the conversion to a packet-switched technology.

Telephone lines are a known source of transmission errors. This is particularly true when efficient modems are used. An efficient modem provides a

transmission rate (measured in bit/sec) that exceeds twice the bandwidth (measured in Hz) used. Although this gives a rather efficient use of the analog voice channel, a small number of errors (perhaps 100/hour) are introduced.

With the TDM technology of several years ago, most of these random errors tended to be visible to the APL user; erroneous data would be printed on the terminal or sent to APL. Some method of protecting the user from minor errors on the network trunks was required.

The usual method of compensating for short error bursts is to group several characters into a block and to append some redundant bits to the block. The receiver can then perform some

arithmetic operation upon the received block, including the redundant bits, to see if a certain class of error has occurred. If the arithmetic operation in the receiver indicates an error, then the receiver requests retransmission of the block.

The Sharp network uses the same redundancy check as does High-Level Data Link Control ($x^{16} + x^{12} + x^5 + 1$ residue). This gives the ability to detect all error bursts of less than 17 bits and most bursts of greater length.

No Protection in Low-Speed Link

The network does not provide any protection on the low-speed link between the terminal and the network and in some locations this continues to

be a source of error. Control of this error source requires some sort of retry protocol between the network and the terminal. Little work has been done in this area by IPSA.

Simple TDM technology dedicates one channel to every port passing over a particular trunk. The channel assignment is made at installation time. It cannot be altered without briefly removing the multiplexer from service (or, as in one extreme case, returning it to the factory).

This fixed assignment of bandwidth can impose limitations on the total number of ports in areas where digital bandwidth is not free. When the entire terminal population consisted of 134.5 bit/sec terminals of the same character length, this was not a particularly onerous restriction. It was possible to squeeze about 15 134.5 bit/sec channels into a 2,400 bit/sec high-speed trunk. The same 2,400 bit/sec can only accommodate eight 300 bit/sec channels.

During the period of transition from 134.5 bit/sec nine-unit terminals to the present 300 bit/sec 10-unit terminals, autospeed presented a further complication. It is desirable to have a single telephone number for both kinds of terminals. With simple TDM technology, it was necessary to have separate telephone numbers and separate channel groups for the two terminal classes. By using a technology without fixed bandwidth allocations, the transition from 134.5 bit/sec BCD to 300 bit/sec Ascii was eased.

Bandwidth Gamble

Packet switching has allowed a bit of gambling on bandwidth requirements. The total dial-up capacity at a remote site can be arbitrarily large. There is no *a priori* bandwidth allocation for a particular port. Bandwidth is allocated on demand exactly as CPU time and file bandwidth are allocated within APL. If an overload exists along a particular route, the symptom is a general slowdown of output.

This is quite noticeable to the APL user, as printing will occur in bursts corresponding to individual packets. This may be caused by a general overload situation such as when transatlantic traffic is running over a single trunk rather than the normal two. An alternative cause is a transient overload resulting from a trunk going out of service for a second or two.

If this happens during a peak period, a transmit queue can build up which will take several seconds to clear down to an innocuous level. Even under light load conditions, a brief service interruption on a trunk will exhaust the end-node buffer pool for a printing terminal. The resulting delay will be noticed by the user.

The location of the pause (mid-line rather than interline) is a side effect of the method of packing APL output lines into network buffers. The educated user can use the location of the printing pause to discriminate between poor performance in the APL machine and network degradation. The observed network degradation may be caused by either an acute or chronic overload. Output is held at the APL machine (or in network transmit queues).

This was considered preferable to
(Continued on Page S/22)

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Sharp's Packet-Switch Net Provides APL Service

(Continued from Page S/20)

loss or corruption of output, and it has also influenced pricing. A 120 char./sec terminal has a lower priority on transmission from APL than does a conventional terminal. This may reduce the mean print speed observed at the 120 char./sec terminal to less than 120 char./sec. For this reason, imposition of a connect time surcharge on 120 char./sec terminals seemed rather unfair.

If a fixed bandwidth had to be assigned to every dial-up port, it would be difficult to accommodate the number of ports demanded by the typical optimistic branch manager. With dynamic contention for bandwidth, a relatively large number of ports can be installed at a site to accommodate peak

connect loads. There is a gamble that not all ports will be continuously engaged in printing. A terminal that is not being used for output requires zero bandwidth.

Packet-Switching Drawbacks

After concluding that simple TDM technology was unacceptable because of the problems mentioned above, some choices still had to be made in a packet-switched environment. Although TDM technology does have certain drawbacks, it also has certain user benefits. If all of the allocated ports are being used to print full speed, it is quite efficient. It can almost always provide very good response time.

Most data transmission systems require some extra bits which are not di-

rectly useful to the end user. For example, the asynchronous terminals used with most time-sharing systems have start, parity and stop bits associated with each character. None of these is directly useful to the end user, but they are required by the asynchronous protocol. Similarly, a TDM requires some extra bits to maintain framing synchronization.

A packet-switched system is even worse. It has a redundancy check for each block. Each block also contains addressing and sequencing information to allow it to be delivered to the proper port in sequence. With the present Sharp network packet size, about 50% of the bits transmitted are overhead bits of no direct value to the user.

With a TDM, the overhead content is closer to 20%. The dynamic bandwidth allocation capability of the packet system tends to balance the higher efficiency of the TDM system. Thus, the number of 30 char./sec terminals which can be comfortably accommodated in the packet system is only slightly higher than the number for a TDM system (12 vs. eight assuming a 2,400 bit/sec trunk).

Packet-system efficiency is theoretically easy to alter. The number of overhead bits per packet is fixed for a particular protocol. By increasing the number of useful bits in a packet while preserving a constant overhead, the apparent bandwidth efficiency (useful bits divided by total bits) can be increased. Unfortunately, the need for acceptable response time constrains packet size.

The network currently uses a 256-bit maximum length packet. For a 2,400 bit/sec link, the length-sensitive term in the delay is 106 msec. Thus, the observed delay with one or more 2,400 bit/sec links in the path is rather sensitive to packet length. Doubling the packet length would change bandwidth efficiency from the present .5 to around .75 but it would also increase delay by 100- or 200-msec in certain parts of the network.

Solution to Tradeoff

A possible solution to the capacity vs. response tradeoff is to vary the packet size with the terminal speed and location. A more complex solution would be to use short packets for the first two packets of an APL response and then revert to a larger packet length.

One important design consideration in a packet-switched system is the most likely form of use. For an APL-oriented network, the expected form is point-to-point communications with relatively long holding times. A single port with a connected physical terminal is associated with a particular APL terminal task. Any interaction with other ports in the network will be via APL facilities for intertask communications, rather than through network facilities.

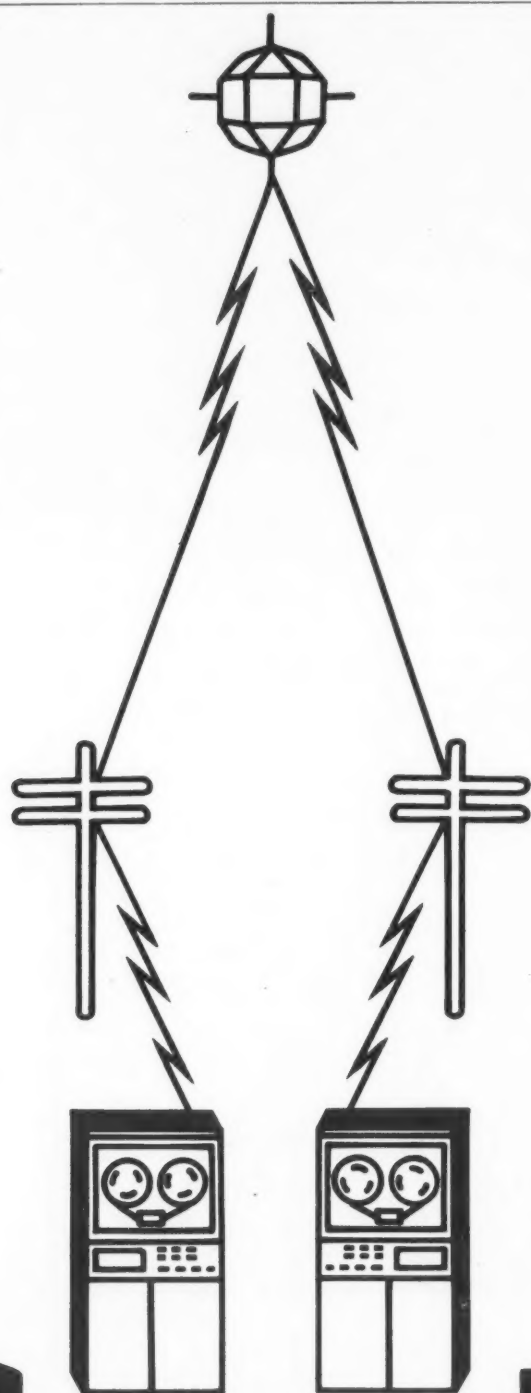
Not all computer networks have this point-to-point property. In particular, a process control system that monitors many different sensors and sends commands to many devices does not have that property.

A network with an orientation toward point-to-point communications is often referred to as a virtual call network. It resembles a switched telephone system in which physical circuits are established and held to accommodate a particular point-to-point call. Certain administrative packets are exchanged to set up a virtual call; this precedes the transmission of any data.

In the Sharp network, this occurs after the initial input line (normally "0") and before the security blot is printed. After the call has been set up, an abbreviated form of addressing can be used. This is possible because there is little need to identify the originator of a packet within a virtual call. There are only two ends to a virtual call; the end that receives a packet assumes it came from the other end.

Datagram Network

An alternative form of organization is the datagram network. In a pure da-



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tagram network, every packet includes the name of the packet originator as well as the destination. In theory, this allows any port to conduct simultaneous dialogues with all other ports in the network. For some applications, this can be useful, but time-sharing does not seem to be one of those.

Datagrams are used within the Sharp network for certain administrative purposes such as call setup and status monitoring. It appears that these uses could be replaced with virtual calls with only moderate inconvenience.

Converting the Sharp network to a strict virtual call organization would provide certain simplifications. In particular, the amount of control information required to route datagrams is proportional to the square of the number of nodes in the network.

In a pure virtual call network, routing information need only be computed and maintained for existing rather than potential virtual calls. This reduces the quantity of routing information to the number of virtual calls times the mean path length. As the network now has around 60 nodes and is continually growing, datagram addressing is becoming rather unwieldy. Changing to a pure virtual call network appears necessary for further growth.

Another advantage of a fixed-route virtual call system is that one of the more unpleasant theoretical properties of a store-and-forward network can be eliminated. Most retransmission and queuing schemes do not provide an upper limit on packet delivery time. It is also possible in some systems for a packet to be lost without the sender being notified.

The usual approach to the lost administrative datagram problem is for the sender to wait a finite time for a response. If no response is received within the time limit, the sender assumes (perhaps incorrectly) that the original packet or the response has been lost.

Unique Call Numbers

With virtual call addressing, a unique call number is assigned to every virtual call in the system. By constraining all traffic to a point-to-point format over fixed routes, two problems can be solved. The packets for a particular virtual call will be stored in the forwarding queues of a small identifiable set of nodes. This is not true for elaborate dynamic routing systems.

When the call is completed or aborted, the packets of the call can be removed from the network. For a call that is being completed in an orderly fashion, the precaution of delaying the call completion signal until the data packets have been forwarded is adequate.

When a node or a link along the route of a virtual call fails, packets are assumed lost and the virtual call must be aborted. An abort signal is passed from both sides of the failure to the endpoints of the virtual call. As the abort signal passes along the route, it has the side effect of destroying any packets belonging to the virtual call.

The virtual call number is then available for reuse, as the previous generation of packets with the same virtual call number has been destroyed.

One other drawback to the existing scheme of routing by node number is

that traffic passing between a pair of nodes reachable by independent paths is constrained to a single path. One reason for this constraint is the simple route table organization.

Within each node the route table is stored as a vector indexed by destination node. Each element of the vector gives the direction in which some other node lies.

As the current route table entries are scalars, it is impossible to encode an alternate route.

A more serious problem is the mechanism that aborts virtual calls after a link failure. It is extremely important that both endpoints of an aborted virtual call receive notification of the abnormal call termination.

When this mutual termination re-

quirement is combined with a requirement that calls not using the failed link remain undisturbed, the termination and routing algorithms impose a condition upon the route tables.

The route from A to B can be expressed as an ordered list of intermediate nodes. With the present routing algorithms, a necessary and sufficient condition for mutual call termination after link failure is that the route from node A to node B must be exactly the reverse of the B to A route for all node pairs.

When every virtual call has its own route, the consistency requirement only applies to individual virtual calls. The route from end A to end B must be the reverse of the B to A route for that virtual call. A simple forwarding vali-

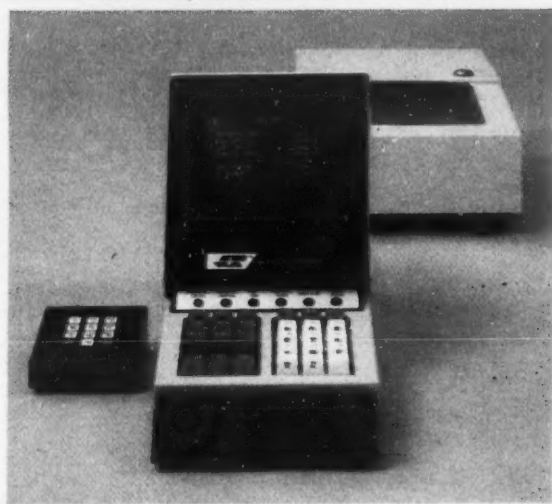
dation algorithm can guarantee this in real time. Other virtual calls with identical endpoints can be routed independently.

One area of concern in the initial design was maintaining performance in the presence of minor line errors. A transatlantic link running at 7,200 bit/sec can store four or five unacknowledged packets. Some link management protocols such as X.25 require retransmission of the entire pipeline after a single error. This has the advantage of preserving packet order over a single link.

It has the drawback of exaggerating the effect of a single error. Instead of retransmitting the single corrupted packet, four or five packets may be re-

(Continued on Page 5/24)

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Packet-Switched Network Serves Users of APL

(Continued from Page S/23)

transmitted. The Sharp network retransmits only the corrupted packet. This has the drawback of permuting the packet order along the link.

If the various packets in the pipeline were associated with independent virtual calls, this would be of no consequence. The order within a virtual call could be disturbed by retransmission. In a network which uses multiple routing, differing transmission delays along distinct paths can give the same effect. The possible ill effects of order loss are avoided by including an interend sequence number in every packet belonging to a virtual call. The receiving endpoint can then process the packets in the order in which they were emitted rather than the order in

which they are received.

APL Interface

The network would be of little value without a connection to the APL machine. Several methods of connection were discussed during network design. An obvious solution would be to preserve the symmetric hardware of a TDM system. At the data center end, data from a single virtual call would materialize on a physical port attached to the network. This physical port would be electrically connected to a Memorex Corp. 1270 terminal controller.

This solution is sometimes called low-speed demultiplexing. It is simple in concept and appears exactly as an ordinary 1270 configuration to APL.

In addition to the obvious problem of requiring large quantities of hardware, low-speed demultiplexing has other drawbacks. The worst is the way in which the entire system is slaved to a 300 Hz oscillator in the terminal controller. Data transfer to and from APL is constrained to a single procrustean speed. There are situations where transfer at a rate which is either faster or slower than the normal terminal speed is desirable.

Running the traffic into the APL machine on a single high-speed line and demultiplexing within the APL machine was contemplated. This was rejected mainly because of the excessive changes which would have been required in the APL software.

The solution which is in use now in-

volves placing a stored program processor between the APL machine and the network. This is a true front-end computer as it is attached directly to a 360-byte multiplexer channel. On the channel side, it looks very much like a Memorex Corp. 1270 or an IBM 2703. Every virtual call uses a separate address on the byte multiplexer channel. The front-end computer can trivially adjust the rate at which data is transferred from APL to the network. This adjustable rate is fairly important in achieving acceptable response time.

When APL starts generating output in response to an input, all of the network buffers for that virtual call are empty. In this situation, data is transferred at high speed over the byte multiplexer channel to fill an initial buffer ration. Data transfer for that virtual call then stops until a buffer has been sent to the terminal.

Another buffer is then filled with data from APL and sent through the network.

This process occurs outside of APL and is not usually visible. The network buffers are independent of APL buffer size and APL output line boundaries.

If the network can absorb output faster than APL is generating it, a partial buffer will be sent. A typical case is the SENT response to MSG. When APL is generating output more rapidly than the network is willing to accept it, the normal APL mechanism for suspending an output-limited task is used.

Flow control is also useful on input to APL. Sharp APL has retained the 1969 APL/360 scheme of demand assignment of input buffers. The default assumption in APL is that an input line will be quite short. If an input line is longer than expected, extra buffers will be assigned within APL.

It is theoretically possible for the network to present data faster than APL can allocate buffers. To avoid loss of keyboard input, a method of regulating the rate at which the front-end computer presents data to APL was required. This was accomplished by sending an explicit end-of-buffer signal from APL to the front-end computer whenever an APL buffer is filled.

The front-end computer suspends data transfer for the affected virtual call until the APL machine signals that a new input buffer is ready. This signalling is normally effected by command chaining on the byte multiplexer channel and thus takes less than 60 microsec.

If intervention by APL software is required to allocate a new buffer, the "buffer ready" signal may be delayed for an arbitrary period. The data is held in the front-end computer until the "buffer ready" signal is received from APL. This solution avoided the potential embarrassment of carefully forwarding (and perhaps retransmitting) a packet over the ocean, and then corrupting it with a race condition in the computer room.

Establishment of a new call is another area where a front-end computer was useful. The number of ports in the network somewhat exceeds the number of T-tasks which can be simultaneously supported with the present IPSA hardware configuration. This makes dynamic allocation of byte multiplexer channel addresses desirable.

(Continued on Page S/31)

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Look again.

Is our expanded Model 85 system in your future?



Take this quick quiz:

(WARNING: there may be more than one right answer to each question)

1. Model 85 is:

- (a) a remote information system we first introduced in 1978.
- (b) a distributed data processing product.
- (c) a multifunction data processing product.

2. Its features include:

- (a) multitasking for up to four applications.
- (b) large disk capacity.
- (c) modular configuration.
- (d) more than these.

3. New improvements are:

- (a) increased processor memory to 256K bytes.
- (b) the addition of remote workstations and printers.
- (c) increased disk storage to 100 MB.

4. Model 85 functions are:

- (a) remote file management and high level language processing.
- (b) on-line file management and stand-alone processing.
- (c) batch communications and volume data entry.

5. Available languages are:

- (a) RPG II.
- (b) COBOL.
- (c) ESPERANTO.

6. Model 85 saves users money as an alternative to:

- (a) enlarging mainframes overburdened by network interactive applications.
- (b) adding communications lines with greater capacities.
- (c) maintaining a mainframe configuration only fully used at peak time periods.
- (d) losing time and money due to mainframe downtime.

7. For more details on Model 85, you should:

- (a) phone your nearest Data 100 sales office or one of the numbers we've listed.

Now check your answers.

All answers but these three are correct.

- 2a: Model 85 offers multitasking for up to eight applications.
- 3c: 100 MB is old figure; Model 85 is now 245.6 MB disk storage.
- 5c: No, Model 85 doesn't speak it. Yet.

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Integrated Net Lets Firm Save \$600,000/Year

(Continued from Page 5/19)

any location — or almost any terminal for that matter — could be used for communications with the computer.

For example, a person could log onto a 3270 for order entry, switch over to check stock availability and wind up sending an administrative message —

all in one session at one terminal.

"The SNA concept lets us design applications as if the entire company were under one roof," Mayer said. "Any terminal can communicate with the mainframe or any other terminal — for more than one application."

With the help of SNA, the net has

helped IP achieve a number of business objectives, including major cost reductions.

"Annual savings are now estimated at \$595,000," stated Mayer. "The original forecast was about \$240,000. These are direct cost reductions in hardware and lines."

"In addition, new applications go on the same terminals. There's no need to add equipment. That's a cost-avoidance not even included in the \$595,000," he added.

Commenting on the three-day business close, Harry Baer said, "We used to prepare directors' statements on the 17th workday after month end. Management wanted financial results sooner. Working closely with the company controllers, we implemented new systems tied into the network and now we get directors' statements by the sixth workday and earnings information the afternoon of the third."

"That's financial information from 114 locations worldwide. We could not have achieved that without the teleprocessing network," he noted.

Reports More Accurate

Another benefit has been a better handle on transportation services. IP is one of the largest users of transportation in the U.S.

Before the network, information on traffic movements was mailed from about 20 key locations to headquarters, then batched for data entry, correction and relay back to locations. Reports often arrived too late to do any good.

But now, the company has a more up-to-date base on movements and more timely and accurate reports. "The whole reporting system has improved," Baer stated.

A major use of the system has been on-line order entry for the company's primary pulp and paper products. Salesmen can enter an order in the sales office, check stock availability at a mill, process the order and get shipment feedback information all at one display terminal.

Marketing data is stored on one regional mainframe, manufacturing data on the other.

Data flows freely from one 370 to the other and between terminals. As far as the user is concerned, all applications related to order entry are tied together.

"It has improved customer service," Baer said. "Our people respond to inquiries faster, we get information to the mills faster and we put manufacturing schedules together quicker."

Before, retransmission of data and enormous clerical effort resulted in roughly a one-in-five error rate in order entry. Now the error rate is insignificant, much less than 1%, even though the number of transactions a day has nearly tripled," he added.

Another plus to the network and SNA has been a productive reversal of IP's trend toward centralization — via distributed processing. The company has already offloaded some processing to remote sites. Eighteen IBM 3790 distributed processing systems have been installed at one division's plant locations, with a total of 30 expected by the end of 1978.

Instead of processing all data at regional data centers, plants do remote editing on 3790s for roll stock inventory, general ledger, accounts payable and other financial applications. The host 370/168 here provides major customer and item file data and network support.

"SNA lets us integrate distributed processing into the teleprocessing network," Mayer said. "In fact, the concept lets you interface any IBM SNA"

(Continued on Page 5/27)

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for field diagnostics



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for programmers

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Incredibly, in one compact package the 1205 offers a portable, micro-processor-based terminal with removable storage media and off-line editing capabilities that rival some of the most sophisticated word-processing systems.

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And when it comes to great moves . . . a salesman, programmer, field technician or journalist can go anywhere, plug the Miniterm 1205 ASR into an ordinary wall outlet, and communicate with any popular CPU via the built-in acoustic coupler.

Because you can prepare, edit and format data off-line where it is generated, and you no longer must store programs in an expensive, time-sharing medium, you can substantially reduce both telephone line charges and program storage costs. In fact, in some cases, Miniterm 1205 ASR's can pay for themselves with savings better than three-to-four times the monthly rental charge.

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Dutch Bank to Implement X.25-Based Network

(Continued from Page S/18) the applications users that the network is closing. The service communications facilities also permit control of terminal test programs from the central location.

Network Control

The services provided by Comsys to operating and supervisory personnel — the staff users — were designed to permit efficient day-to-day management of the network. The complete network can be controlled, configured, monitored and tested from the central location. As noted earlier, the staff user is provided with comprehensive statistics gathering and logging facilities and with the means for communicating with subscribers.

The central network control facility lets staff users perform the functions required for operational control, configuration control, failure handling, collection of quantitative information about the normal operation of the system, chronological surveys of certain system activities and in-

formation on error situations. A duplicated network control data base is maintained at the control center, containing a complete record of the current identification, status and interrelationships of all network components and users.

Each entity in the data base is defined in terms of several attributes. A staff user, for example, is identified by a password and a function key which specifies the system

functions to which he has access; a subregion in the network structure is defined in the data base in terms of its internal and external identification, address, activity state and so on.

Control Commands

The network controller has an extensive set of configuration control commands with which new entities or attributes can be entered and ex-

isting ones queried, altered or deleted. Complete administrative control of the network may thus be exercised from the central location without the need for Sysgen procedures.

The first Comsys installation is dedicated to banking, but in the opinion of the Amro Bank, the system is suitable for application to a wide range of data communications requirements in commerce, industry

and government. The standardized interfaces and modular, clearly layered internal structure of the system permit adaptation to different environments with a wide variety of functional and performance requirements.

Van der Toorn is manager of data communications with Amsterdam-Rotterdam Bank N.V., Amstelveen, the Netherlands.

Net Brings Big Savings

(Continued from Page S/26) terminals to the network. There are no teleprocessing facilities at IP not part of the system at this time.

That includes about 50 IBM 3770 terminals used for message switching of administrative traffic such as reservations. With the 3770, IP has removed the last vestige of its paper-tape teletype writer network.

Any IBM Terminal

The network permits message traffic on any IBM terminal. For those locations without such a terminal, IP has replaced teletypewriters with the 3770 teletypewriters. Some 160 teletypewriters have been eliminated. The network now has 160 3270 CRTs.

One of the surprising results of IP's integrated network is consistent response time of three to six seconds. Despite growing volumes, the company has managed its system resources most effectively.

Has the effort to integrate computer functions at IP been worthwhile? The network has cut direct costs almost \$600,000 a year, and because new applications can run on existing equipment, there is built-in cost avoidance.

At a time when information becomes one of a corporation's most valuable resources, IP has determined how much of that resource it needs and is finding ways to use it effectively.



Dear Ma:

How come Racal-Vadic can build a 1200 bps full duplex acoustic coupled modem and you can't?

When Racal-Vadic invented the VA3400 way back in 1973, they purposely chose to transmit data in the originate mode at 2250 Hz and receive data at 1150 Hz. They were really thinking ahead, Ma, because these frequencies place 2nd harmonic distortion (created by non-linearity in the telephone microphone) at 4500 Hz — well away from the coupler's received signal.

This wise choice of frequencies has made possible a 1200 bps full duplex acoustic coupler—the VA3434, which is now in full production at Racal-Vadic!

Why in the world, Ma, did you reverse the frequencies in your 212A? By transmitting at 1200 Hz and receiving at 2400 Hz, the 2nd harmonic of your transmitted signal falls right in the middle of the received signal, making the design of an acoustic coupled 212A an engineer's nightmare.

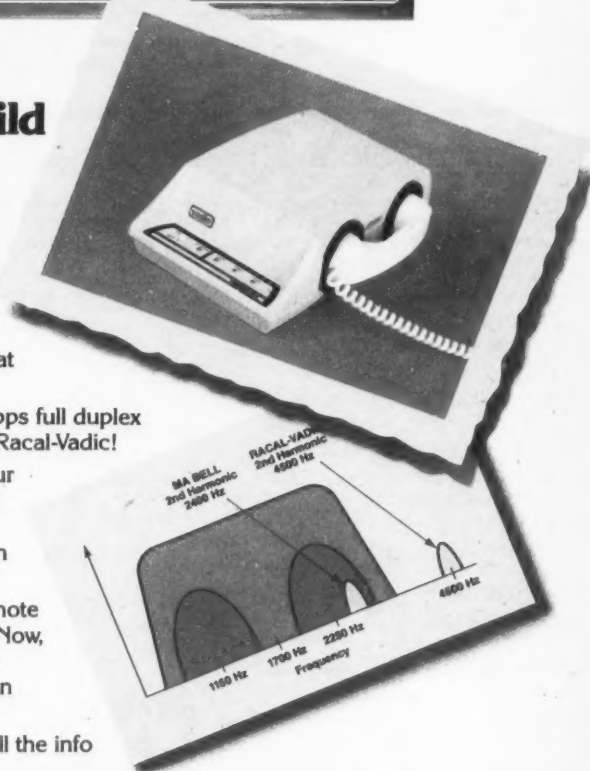
So Racal-Vadic has done it again, Ma. The real winners are remote terminal users who no longer have to settle for 300 bps operation. Now, merely by replacing their present coupler with the VA3434, they can operate at 1200 bps full duplex, while retaining the portability that an acoustic coupler provides.

Suggest that you phone or write Racal-Vadic today, Ma, for all the info on the VA3434 1200 bps full duplex acoustic coupler.

Your independent thinking son,

PS: Racal-Vadic has shipped over 175,000 modems to date.

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Distributed Net Helps French Bank Grow . . .

(Continued from Page 5/3)
isting administrative core:

- At the top of the hierarchy is the Paris DP center.
- At the next level, performing about 30% of the daily batch processing and acting as backup for the Paris center, is the Aix-en-Provence DP center.
- At the next level are over 200 regional centers, which operate like small banks with a number of branches under them. Because bank management did not want to impose a

reorganization of the banking structure on top of a DP system change, the distributed system was designed to have a remote processor at each region.

- Each region, in turn, serves an average of about 10 branches, each of which has a terminal controller and an average of about five terminals for a total of 10,000 terminals in the system. The terminals are nonintelligent CRT-type units with printers attached. Application and

control logic resides in terminal controllers for first-level control and in regional processors for secondary control.

Terminals are on-line to the regional processors via controllers. During the working day, tellers use the terminals to verify account balances, record deposits and withdrawals, perform end-of-day balancing and so on.

Selected information for each customer served by a branch is stored on disk at the regional level. During the day, these records are updated on-line and the same transaction forwarded to Paris or Aix.

Complete Customer File

The complete customer file, located in Paris and Aix, includes account history and full description of banking products used by each customer. The average record length is 1,500 bytes. During the day, this file is accessible by all terminals.

In addition to these inquiries, some updating of specific centralized files is done directly from branch terminals. About one half of total updating transactions come from outside sources — other banks,

clearing houses and so on.

All official updating is done by the center systems, at night, on a batch basis. After completion of updates, updated records are transmitted back to the regions.

Interregion Transactions

About 10% of transactions originating within the regions apply to records stored at other regions. These interregional transactions are automatically transmitted to the appropriate regions. As a result, a customer from the south of France can easily cash a check at a branch in northern France.

Reliability and backup within the system have been given high priority by the bank. If a regional processor is down, switches can be thrown to reroute transactions to either Paris or Aix, so these central sites provide backup for the regions.

A terminal controller in a branch could go down, disabling all terminals at the branch. To secure against this possibility, it would be necessary to install dual controllers at the branches, but because of

economic reasons and a statistical study (of hardware reliability), this has been left undone for the present.

Designed for Expansion

However, the system has been designed for expansion and these dual controllers are included in future plans. The bank does not think this a problem area because of the controller's simple structure.

Since the regional centers and branches do not need computer operators, Societe Generale is able to significantly lower costs. This has resulted in equipment savings, too, by allowing the utilization of equipment that can operate in an unattended mode.

No local programming capability is provided for the regional processors; programs are controlled and loaded from the central sites. With more than 200 regional processors, an operations and programming staff for each could create a huge expense.

The bank checked carefully into the feasibility of this type of operation before finally deciding on the distributed approach.

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- Two models:
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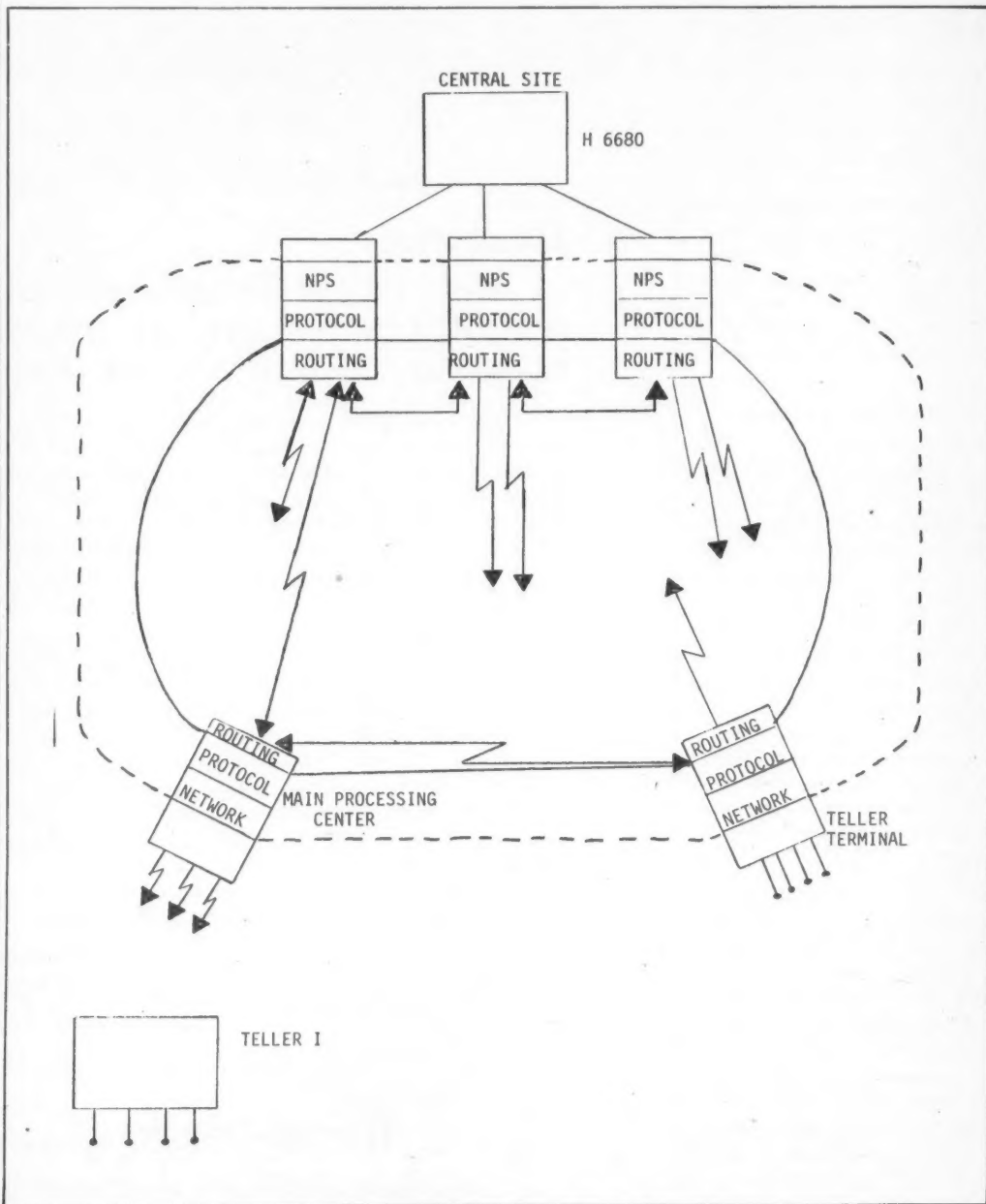


Figure 2. Societe Generale Structural Interface

... By Coordinating Services at 2,600 Branches

tomers, improved conditions for decision-making, de-fragmentation of work in branches and reduction in teller's administrative tasks were the main objectives in automating the bank's teller system.

Before SG2 could design a fully integrated teleprocessing system, however, its researchers had to analyze Societe Generale to determine type, quantity and flow of the data to be processed; geographic location of data input points; response time required by conversational data; potential security problems; and role of input points not involving system personnel.

These objectives were constantly related to the bank's aim to upgrade customer services, facilitate decision-making, centralize the system's functions and reduce the time spent on administrative routine.

Three main objectives were defined in the management information system plan: The system:

- Must simplify data acquisition by reducing the codification by the terminal's data input screen masks and through direct gathering of data on terminals, thereby avoiding transcriptions used in batch processing.
- Must provide instantaneous access to files giving only the desired data.
- Must be automated, using point-of-sale (POS) terminals at the customer's offices and automatic teller machines for such things as funds transfer, bill remittance and stock exchange.

Network Design

The bank's redesigned data network is comprised of two day-processing centers (Paris and Aix-en-Provence) equipped with two mainframes (dual Honeywell, Inc. H66/80 processors) linked by a high-speed 56K bit/sec line and 2,000 Inter technique controllers linking CRT terminals from Sintra, Logabax and other suppliers.

The number of terminals will soon be increased to 10,000 units.

The design of the on-line teleprocessing network system closely copies the management structure of the bank in order to perpetuate the decision-making centers and to allow the system to adapt to local operational demands.

By keeping the teleprocessing system congruent with the decision-making structure, SG2 ensured that the appropriate information would be available to the administrators who need it.

Two types of data bases, one at the main centers and the other at the local levels, manage all customer accounts. The

data bases are comprised of information relative to each customer and enable Societe Generale to handle 2.7 million customers, four million accounts, and two million daily transactions.

In operational terms, the redesigned system allows branches to work independently of the DP center and in real time for 80% of their operations. The response time is very short and the system fil-

ters out unessential and improperly prepared data from the master terminals.

In concrete terms, the redesigned system, called RTA, enables Societe Generale to handle two million transactions per day at 100 transactions per second. It allows local terminals to handle all usual transactions and incorporate keyboard and display screen equipment.

The number of workstations

at a local branch can be varied, with one terminal controller used for every four CRTs.

The system can also be linked with other types of terminal equipment, such as automatic bank note dispensers.

At the main DP centers, the H66/80 dual-processor CPUs have 1,024K words of memory and are front-ended with a Datanet, Inc. 355 with 64K bytes of storage. The regional processors are Honeywell Bull

H716s with 64K words. These processors interface with the controller terminals on the local level.

To ensure the security of the system, an automatic surveillance system and decentralized control were implemented.

Kathi Bylander is administrative assistant with SG2 at Suite 1178, 8350 N. Central Expressway, Dallas, Texas 75206.

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NEWTON, Mass. — American Fabrics, a wholesaler and importer of drapery, upholstery and decorator fabrics headquartered here provides same-day order shipping services to its customers throughout the country. In order to facilitate that rapid service, American Fabrics depends on what management information systems director Maurice G. Parent calls "a totally interactive business management system."

More than 60,000 transactions per day are entered into American Fabrics' central IBM 370/148 in Massachusetts via sophisticated and efficient telecommunications systems linking the host CPU with interactive CRT terminals and output devices located in major metropolitan areas across the country.

The Los Angeles regional distribution center alone accounts for approximately 15,000 transactions daily.

A Matter of Pride

"We have 16 interactive CRTs in Los Angeles which are used primarily for on-line order entry," Parent said. "That data affects all aspects of our business — inventory, back orders, shipping, accounts receivable and purchasing."

"American Fabrics prides itself on the fact that we can receive an order, process it and update all the necessary files here at the central facility and then output shipping documents at the regional center and have the order ready to go to the customer in less than two hours. Response time is absolutely critical."

By implementing a PIX-II "virtual data link" data communications system from Paradyne Corp. of Largo, Fla., American Fabrics cut CRT response time at its Los Angeles offices from 10 or 12 seconds to less than five, according to Parent.

The PIX-II is a minicomputer-based system that allows IBM 360/370 users to reduce communications costs by linking multiple remote devices to a central host CPU over a single land-based or satellite communications line and to implement Synchronous Data Link Control (SDLC) protocol without teleprocessing software overhead on the mainframe.

The PIX-II system consists of a local control unit (LCU), which attaches to the byte multiplexer channel of the host, and remote control units (RCU) in dispersed sites that can support multiple IBM, IBM-compatible and/or Paradyne devices such as interactive CRT terminals, printers, card readers and tape drives.

All data communications functions are transparent to both the host and remote users and remote devices function virtually in a local mode.

"The Paradyne system was implemented in November to replace a Comten, Inc. 3650 multiline concentrator, utilizing IBM's Network Control Program/VS and Btam software, which previously supported a bisynchronous satellite link to 16 CRTs and two printers in Los Angeles," Parent said.

"Since then we have recognized several important benefits from the system. First, PIX-II operates on an

attention-interrupt basis. That is, the CRTs communicate with the mainframe only when they have data to send. The elimination of time-consuming polling procedures has been a huge factor in improving our response time.

"Secondly, by improving our response time, we have been able to achieve better remote printer utilization."

"Third, the Paradyne system allowed us to implement bidirectional data transmission using SDLC without all the grief usually associated with other vendors' SDLC."

"Fourth, we have a mixed communications and systems software environ-

ment, and the transparency of the PIX-II system means it can perform its functions efficiently without impacting other systems," he added.

The PIX-II configuration now in use at American Fabrics includes an LCU attached to a 2M-byte IBM 370/148 operating under DOS/VS. The LCU supports an RCU in Los Angeles which, in turn, supports 16 Harris Corp. 8170 interactive CRT terminals, a 165 char./sec printer and a 200 line/min printer. All of these devices communicate with the mainframe over a single satellite link at 9,600 bit/sec.

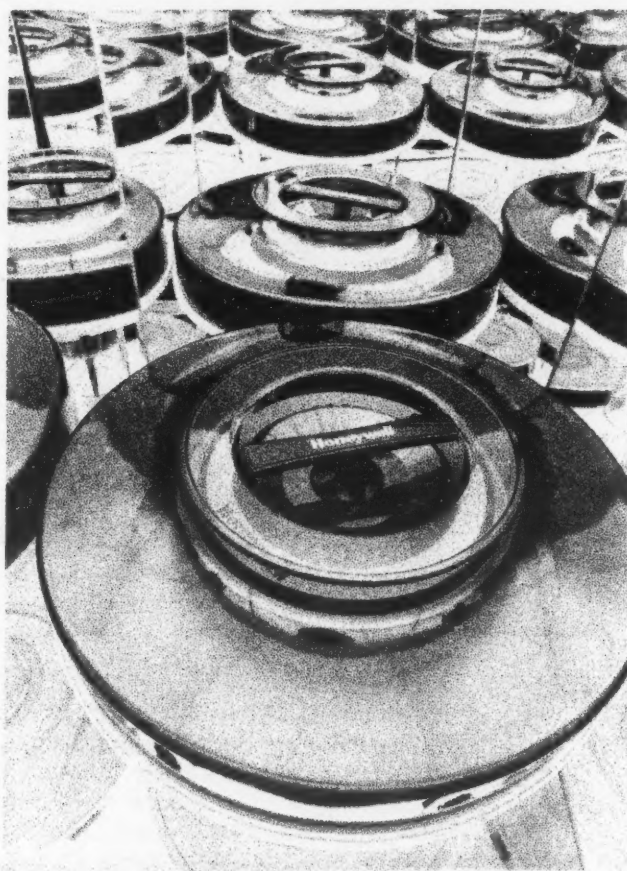
Parent explained that the decision to install the Paradyne system came about as a result of steadily degrading

CRT response times as more and more devices and applications were implemented in Los Angeles. "When the CPU has to poll 16 to 18 devices and wait for acknowledgements, the overhead is just too high and response time suffers," he commented.

Prior to implementation of the PIX-II system, data communications traffic was increasing as the company added general accounting applications to the high-volume order entry applications, further compounding the problem of slow response time. "It was a situation of too many users competing for the attention of the mainframe," Parent said.

(Continued on Page S/31)

DATA BASE CONTROL.



Satellite Link Lets Firm Cut Response Time

(Continued from Page S/30)

"There were only two alternatives to the PIX-II system: We could have put in a second satellite link at a cost of around \$2,100/mo — about the same cost as the PIX-II system. Or we could have upgraded our mainframe for an additional \$10,000/mo. But although these alternatives would have speeded our processing capability, they could not have done what PIX-II does — that is, give us faster CRT time," he said.

Remote Printer Use

Response time improvement also resulted in more efficient use of the two remote printers in Los Angeles. American Fabrics prints out management exception reports at night.

"Getting those reports out immediately is critical to our same-day policy," Parent said. "Unless they are printed out and kept absolutely current, there is no way we can respond to customers' orders for fabric in a timely fashion. Many of our customers are smaller decorator or upholstering shops, and the sooner we can get the product to them, the sooner they get paid by their customers."

Under the old communications system, response time on the printers was so slow that when the regular day's work would begin, the printers were still tied up printing out the previous night's reports and couldn't be used for more critical work, Parent recalled. The problem was not with the speed of the printers; it was with the speed at

which they received data.

"Binary synchronous protocol only allows one-way data transmissions and it was killing us," he noted. "SDLC allows the simultaneous two-way transmission of data over the same communications link and effectively doubles the transmission rate," he added.

While SDLC offers definite advantages over binary synchronous protocol, including two-way transmission and data transfer rates up to 56k bit/sec, Parent cited general resistance among DP users to its implementation. Large systems software programs and a good deal of systems programming manpower are usually required to support it in an IBM environment, he said.

"By contrast, we were up and running with the PIX-II system in a matter

of hours," Parent said. "The only systems programming we had to do was to write a patch for our CICS teleprocessing monitor software to redesign the remote peripherals in Los Angeles as local devices."

"That took no time at all, and we have absolutely no software maintenance problem because control of all data communications functions between Los Angeles and the CPU in Massachusetts is handled by the PIX-II LCU and not by the mainframe," he said.

Transparency an Asset

In addition to the PIX-II between Los Angeles and Massachusetts, American Fabrics also uses its Comten multiline concentrator system to support smaller remote configurations in Dallas and Miami.

"In those locations," Parent explained, "the number of peripheral devices requiring telecommunications support and the volume of transactions handled are not yet high enough to require switching to a Paradyne-based system. Those sites have less than half the number of remote devices the Los Angeles site has."

"What is interesting to me," he added, "is that the PIX-II is coexisting nicely with our older telecommunications systems. Because it is totally transparent to both the remote user and host, it has allowed us to continue to use the Comten system under NCP/VS and Btam to support low-volume remote operations."

American Fabrics is currently implementing a second PIX-II RCU, 16 CRTs and two line printers at its expanded Dallas warehouse facilities. Next year the firm plans a third link to its new Chicago warehouse.

"Those planned installations illustrate what we consider to be the criteria for switching from a binary synchronous communications system to the faster PIX-II SDLC — the need for local response time in a high-volume interactive environment at a remote site," Parent concluded.

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Honeywell

Net Provides APL Service

(Continued from Page S/24)

When the front-end computer signals a new connection to APL, control information pertaining to the call is transmitted to APL. The terminal protocol (Ascii vs BCD), terminal speed, port location and the user's right parenthesis are passed to APL.

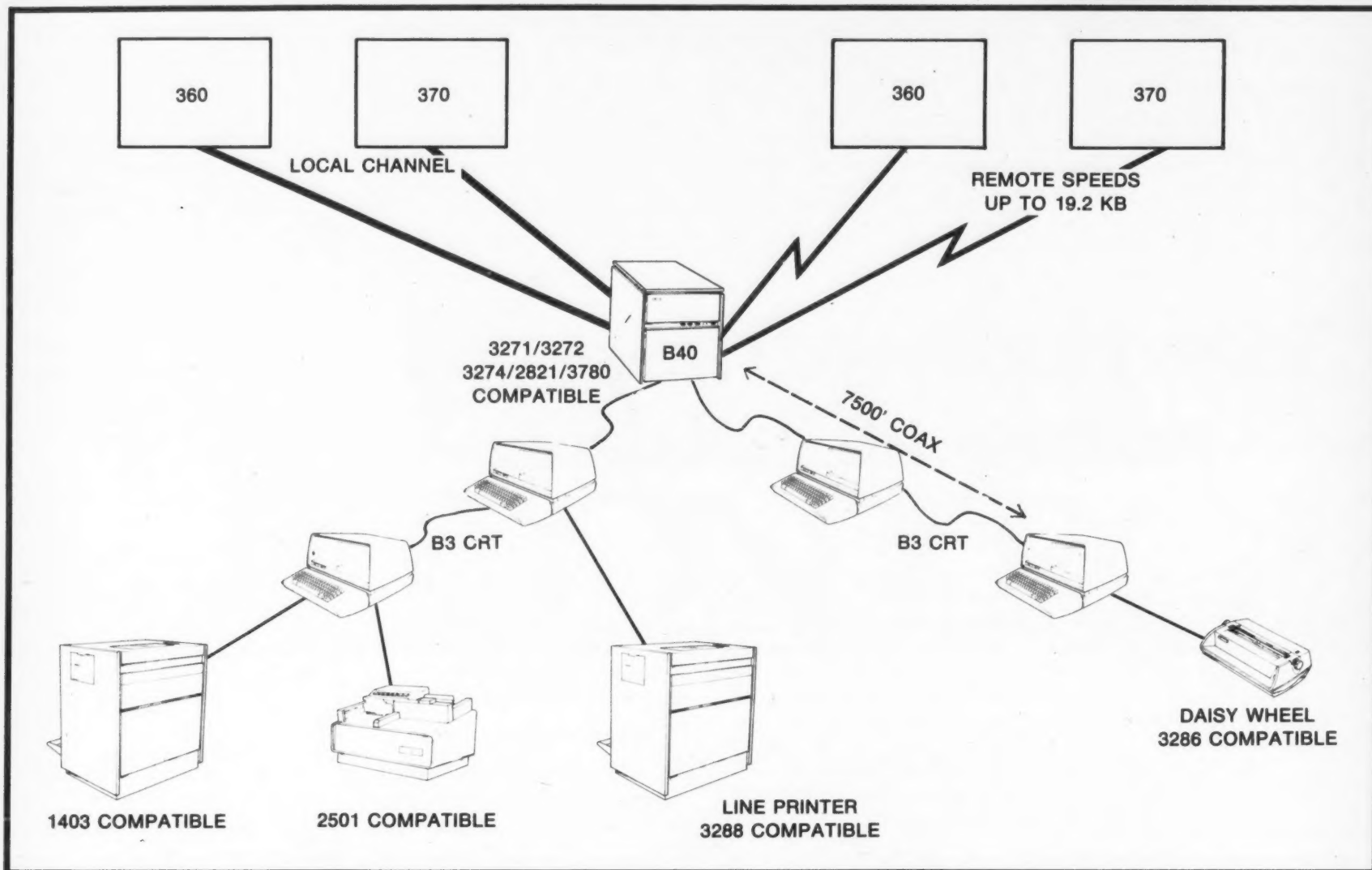
The APL software needs all of the information except port location to communicate with the user's terminal.

Conversion from TDM technology to packet-switched technology has been done with minimal change to APL. Both the internal structure and the external appearance are approximately as they were before the introduction of packet switching. There has been some sacrifice of response time in order to achieve greater reliability and capacity. The greatest present and future benefit is the ability to provide reliable service in many locations.

Moore is vice-president of I.P. Sharp Associates Ltd., Toronto, Canada. He was an implementor of APL/360 at IBM.

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BRAEGEN

A Marked Shift in Attitude Management Entering Age of Master Planning

By Errol Gold
Special to CW

Most information networks have evolved without a master plan, primarily because technology has likewise evolved in a piecemeal fashion, intent upon fulfilling immediate applications needs rather than providing tools with the flexibility to accommodate future contingencies.

The industry has been conditioned to think in terms of decade-long (or less) life cycles for systems, at the end of which it starts over again, admittedly with better tools for doing certain jobs but without the wherewithal or the time to plan and implement a management-oriented network with a life cycle independent of its hardware components.

The development of processors and system software for specific functions such as batch processing, interactive data entry and time-sharing has led to multiple networks that can't be linked together.

Now that there is a strong demand for large-scale communications networks, the user faces a difficult decision as to whether or not to overlay another specialized system over existing systems, thereby generating excess operating costs and inefficient utilization of host computers and communications lines.

New Age

A marked shift in attitudes of large-scale DP managers heralds an age of master planning independent of vendor-advocated solutions. Whereas the DP manager previously viewed the computer as a solution for only the most critical accounting problems, he is now defining systems as tools for day-to-day management of an organization's entire operations.

There is very little talk these days of programmed decisions and a great deal of talk about human interaction with the computer at all levels of the organization to make human decision-making better and easier.

It is the intent here to discuss some of the elements of network master planning gleaned from cooperation with large-scale users.

Master planning is by definition a projection of events over a longer time period than conventional business planning and may encompass a number of alternate business plans. It extends the planning cycle by focusing on organizational purpose. Goals and objectives may change from year to year, but purpose is more enduring.

For example, one of our customers defined the overriding purpose of its network as improving customer service. The specifics are redefined each year, but the network is expected to be responsive to those specifics, whatever they may be.

Another DP manager was called upon to support a total restructuring of the way his company does business on a global level. He cannot afford the luxury of wondering what happens if the company makes a major acquisition five years from now or if the marketing department launches a major campaign in Africa.

His purpose is to be prepared to move information from any given point in the world to any other. If there

are gaps today in technology or products meant for tomorrow's job, the master plan does not skirt them; it defines them, puts a timetable on them and calls for an ultimatum to the vendor community.

First Rule of Planning

So, we might conclude that the first rule of master planning is hardware/software (vendor) independence.

This statement then presupposes that:

- Incentives for developing and evolving future network technology will come from the user community, not from manufacturers.
- Users will not be limited to using

one vendor's product line exclusively.

- The long-standing manufacturers' practice of "locking out" other vendors will gradually disappear. This applies as equally to peripherals and telecommunications equipment as it does to computers.

- Network architectures uniquely styled to accommodate one vendor will become a risky investment.

The fact that IBM supports and assists other vendors in tying into its Systems Network Architecture (SNA) assures that this is more than a trend. It is surprising that other mainframe and minicomputer firms have not made more of this issue, because there may be room for multiple architectures

in the grand scheme of networking, providing they all work together.

Forsaking Top-Down Approach

The second most important element of network master planning is that implementation doesn't have to be linear, providing that all of the components are compatible or can be made compatible.

You can start in the middle, at the nodes or at the mainframe, whichever best serves the organization's purpose. This is evidenced by the fact that some SNA users will have their networks 50% to 85% installed before all of the components of SNA are fully de-

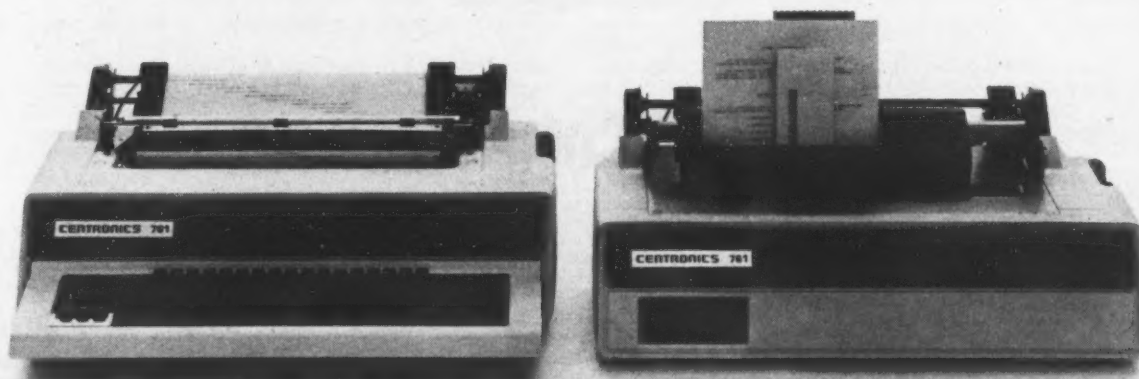
(Continued on Page S/34)

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Master Planning Means Looking Further Ahead

(Continued from Page S/33)
bugged and released.

This departure from top-down architectural design approaches is practical for a number of reasons.

First, if the distributed network processors support concurrent local processing and local data bases (as they should), they can start paying for themselves before they go on-line to a mainframe. In fact, for that previously mentioned user who emphasizes customer service, the remote site with its local files is far more critical than the mainframe because that is where the organization interfaces with its customers.

Second, if the network is truly transparent to the terminal user, then he doesn't really know how much or what

parts of the network are up and running as long as requirements for the task at hand do not exceed his training to date and the network resources at hand. Maintaining that balance from beginning to end of implementation is a function of master planning.

Finally, if the user has a large investment in existing equipment and software (as he usually does), it is to his obvious advantage if a large percentage of that investment can be transferred either permanently or temporarily to the network under development.

One user candidly confessed that he would not have gotten his network off the ground without being able to use some existing equipment, even though that equipment is not part of the ultimate master planned network. Another

advised us that he can get by for two or three years by using dial-up batch transmissions from remote processors of different vendors, freeing a portion of his limited budget to solve more pressing management problems.

Yet the user has not sacrificed his future potential for interactive mainframe communications. These options might not have been available with the top-down approach.

Addressing Contingencies

Another major element of master planning is addressing contingencies beyond the control of the organization. A master plan, as you might suspect, contains a number of "if-then" statements. But whatever the "if," the "then" has to leave the manager with a

feeling of security for the many millions of dollars being committed to network development.

What if:

- a new generation of superfast bubble memory mainframes emerges?
- national telecommunications policy in Canada forces use of a nonstandard protocol?
- we enter a new round of legislation on computers and privacy?
- the network control center gets overloaded as more channels are opened and remote sites activated?
- public and private communications facilities continue to escalate in cost?

These kinds of questions, added to the sheer logistical complexity of a large network, prompted one of our customers to say that the old "40-20-40" formula in planning systems was not valid for networks. That formula simply means allocating 40% of resources to preplanning, 20% to implementation and 40% to follow-up. A more appropriate ratio, he said, is 60-20-20.

Not only are there more contingencies to plan for, but the difficulty in fixing problems after a network is running is magnified by the number of remote systems, the number of terminals, the number of people using the system, the number of applications programs being run and so forth.

User at the Helm

No single vendor is likely to point out such potential constraints and contribute independently to their resolution unless the user first defines the requirements and establishes a new basis of competition that focuses on where the user wants to go rather than what the vendor has on the shelf.

Budgeting is an element of master planning that doesn't require any justification, but there is one major difference with the new breed of network master planners that sets them apart: They are no longer considered by their management as an overhead expense or another necessary evil that one must tolerate if the business is to grow.

They are now an integral part of management, delivering tools to solve day-to-day problems directly affecting the conduct of business. As one customer put it: "Sure, we go out to the field, install a system and tell the local manager he can now do his job twice as fast with half the people. But it's his decision; it's his profit center, not DP's."

"He may choose to reduce his costs only through attrition or he may choose to put displaced employees to work doing something else that improves his organization's performance. It's none of our business. Our principal concern is that the manager be prepared technically and operationally to make knowledgeable decisions and, further, to oversee that intersite transactions function smoothly."

Obviously, though, there are still elements of overhead to contend with. According to a fairly comprehensive survey of SNA users by SBS Publishing Co., the most frequently cited disadvantage was underestimated costs, attributed mainly to increased mainframe memory requirements, lengthy and costly training, higher salaries for those trained and, in more than half the cases, an upward CPU migration. A large percentage of respondents said



Looking back. And ahead.

All indications have it that 1978 will go down as another banner year for the computer industry. User spending for 1978 should at least match the IDC — projected \$42+ billion, up 15% from 1977. Budgets in almost every major category show increased growth over 1977, and 1979 is shaping up to be a repeat performance.

Our December 25/January 1 Combined Issue Special Report takes a look back at the year in computers, as well as a look ahead for 1979. The *Computerworld* editorial staff will take a break from the holiday season just long enough to give you some hindsight and foresight on topics like:

- The impact of inflation on computer use and configuration
- User-vendor relations
- Market trends — products projections for '79
- The year in court — IBM and Memorex

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And Recognizing the User Organization's Goals

they did not achieve expected line cost savings.

We do not know how many of these users adopted the top-down approach, how many were mixed-vendor networks or how many were early victims of Parkinson's Law applied to systems, but we do know that our customers are accumulating savings at the nodes that just might absorb a lot of the added costs of SNA.

Whereas a few SNA users reported a two-year payback, most ranged up to five years.

Further Implications

Master planning implies, then, multiple return-on-investment analysis, multiple methods of acquisition (rental, lease, purchase), a mixture of private and common carrier facilities and other areas of financial planning — all staged to permit a network to pay for itself as it develops to the greatest extent possible.

Since the subject of an SNA survey was brought up, it is only fair to state that all users agreed that the advantages far outweighed the disadvantages, but further concluded that there is no quick and simple answer to whether SNA will benefit a given installation.

It is also interesting to note that the users' reasons for installing SNA did not correlate with the benefits cited after installation.

For example, centralized network control was one of the least mentioned reasons for switching, but was the most often stated benefit, all of which tends to support the case for master planning.

There are many other elements of network master planning, some of which are general and some of which are unique to a particular user. It is an art that might be described as a super-set of all the planning functions that go into system definition, hardware selection, implementation and management extended much further in time.

Customer reaction to Computer Automation, Inc.'s master plan for product development has been favorable. Under the plan, products must:

- Accommodate other vendors' equipment — IBM 3270 terminal clusters, IBM 3790 systems, Dataspeed 40/4 clusters, X.25-compatible devices and peripheral devices from many different manufacturers.

- Concurrently support major protocols — Synchronous Data Link Control, X.25, bisynch (2780, 3780, 3270, Hasp/20).

- Allow for centralized control and security — downline loading of software, downline loading of remote diagnostic software, protection of network integrity if any element goes down.

- Aid data base management — permitting users to design distributed data bases which, subject to predetermined controls, provide access to files resident at any location in the network by terminals anywhere else in the network.

- Allow for two independent and concurrent synchronous communications links from each processor, which facilitate interactive data traffic with both the mainframe and other elements of a network.

- Protect against obsolescence. Since all components interface to the network, rather than to each other, any component (including the mainframe) should be upgradable without dislocating the entire network. Distributed processors interface to the network via

software and have a library of software emulation packages that keep them flexible to future changes.

- Protect against escalating communications line costs. Local data bases plus node-to-node direct link-up allows users to optimize volume and schedules of traffic. (Dynamic load-leveling algorithms must be developed to produce self-optimizing networks.)

- Protect against overloading the network. The protection will involve a combination of previously noted load-leveling features, distributed data bases, front-end devices and the expandability of the network to further hierarchical levels of distributed processing.

- Provide for advances in satellite technology. Changes will be required

in protocols to compensate for propagation delay problems and to take advantage of the broadcast mode of satellite transmission.

- Allow for unlimited growth potential, made possible by interlocking networks, with network traffic controlled by dedicated minicomputers, all totally transparent to the terminal operator.

Such elements of a vendor's master plan can hardly be a secret because they echo the customer's present and future needs. How the vendor does it is his business. That it gets done is the business of user master planners.

Errol Gold is technical director at the Commercial Systems Division, Computer Automation, Inc., Irvine, Calif. 92713.



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Charges Microdata 'Unethical'

User 'Misled' Regarding Upgrade Costs

By Jeffrey Beeler
CW Staff

BELLEVILLE, N.J. — A user here thought it could afford to make desperately needed enhancements to its minicomputer system until the company discovered recently that a proposed operating system upgrade would cost at least 25 times more than its vendor's original estimate.

Now, the user — Hardman, Inc., an industrial adhesives manufacturer — has at least temporarily abandoned its planned software enhancement as too expensive, and company vice-

president John Hardman has accused his vendor of "unethical" marketing practices.

Hardman charges the vendor, Microdata Corp., with deliberately "misleading" him about the full cost and consequences of upgrading from the 2.5 release of the Microdata Reality operating system to the more powerful 3.0 release.

When Hardman first inquired about such an upgrade early this year, he was reportedly informed that the procedure would merely involve swapping one operating system release for another and

would cost just \$2,500 — a figure even his small firm could comfortably afford. But when he later tried to obtain the 3.0 release, he reportedly found that the local Microdata dealer — Minicomputer Sales and Leasing, Inc. — had neglected to tell him that the upgrade also involved the purchase of a "configuration chip," a programmable read-only memory that had not been required for the older 2.5 release.

Without the configuration chip, he learned, the enhanced software product would prove practically worthless because it would

not be able to accommodate any of the memory modules and peripherals he had added to his system since its acquisition a year earlier.

Dealer's Demands

Unfortunately for the user, the dealer reportedly refused to sell Hardman the indispensable configuration chip until he first rebought from Microdata all the expansion hardware he had originally obtained from independent vendors.

To make matters worse, the dealer insisted Hardman buy the equipment at Microdata's own prices, not at the much lower open market prices he had formerly paid.

The dealer representative who reportedly negotiated with Hardman could not be reached for comment on the charges. Microdata, however, denied any wrongdoing in the incident.

If Hardman had complied with the Microdata dealer's demands, the cost of rebuying all his expansion hardware modules would have totaled an estimated

(Continued on Page 62)

Slew of Enhancements, Additions Give Wang Users Upgrade Paths

By Jeffrey Beeler
CW Staff

LOWELL, Mass. — Wang Laboratories, Inc. extended the upgrade path for a large segment of its customer base when it recently announced a raft of additions and changes to its bottom-, middle- and top-of-the-line systems.

With the announcements, Wang added 11 hardware offerings to its high-end VS systems series, an extension to its low-end PCS desktop computer series and three products to one of its mid-range lines, the MVP.

In addition, the company expanded its VS and MVP configurations and announced assorted price cuts for the high-end series.

Some of the hardware additions to the VS systems include the 2246S serial workstation plus the 22V07 workstation/printer I/O processor (IOP), the 2280V series of fixed/removable disk systems plus the 22V08 disk unit IOP and the 2209V-2 magnetic tape unit plus the 22V05-2 tape system IOP.

The remaining VS series hardware introductions include the 430 line/min 2263V-3 chain-line

printer, the 2256 series serial interface and three communications offerings — the 2249V-6 remote cluster controller, the 2246R stand-alone remote workstation and the 22V06-3 communications IOP.

With Wang's recent enhancements (Continued on Page 64)

Mini Sends Pharmacist Home Without Briefcase

By Marguerite Zientara
CW Staff

HERRIN, Ill. — Ernie LeQuatte no longer has to take paperwork home at the end of the day from the drug store he owns, thanks to a minicomputer that keeps his records current with each transaction.

With a drug store that fills more than 300 prescriptions per day, LeQuatte automated his operations because of the large amount of paper processing that is required in third-party drug prescription programs, such as public aid plans and insurance plans.

For a year and a half, he occasionally visited Midwestern computer companies in search of a minicomputer system that would fit his needs and budget. After evaluating systems from Texas Instruments, Inc. and IBM, he

opted for a Honeywell, Inc. Level 6 minicomputer marketed by General Computer Corp. (GCC) of Macedonia, Ohio.

"I looked at GCC's software system and thought it was the most fantastic thing I've ever seen," LeQuatte said. When he first observed the software in action, it was installed in a chain drug store and was running on Singer Co. equipment.

GCC also displayed the system at its offices, where it ran at a faster speed on Wang Laboratories, Inc. equipment. When GCC began putting together a pharmacy-oriented package, Honeywell offered "a good piece of equipment" at a price retail pharmacists could afford, LeQuatte said.

The major benefit of the system (Continued on Page 66)



Wang recently added 11 products plus main memory and disk unit enhancements to its VS systems line.

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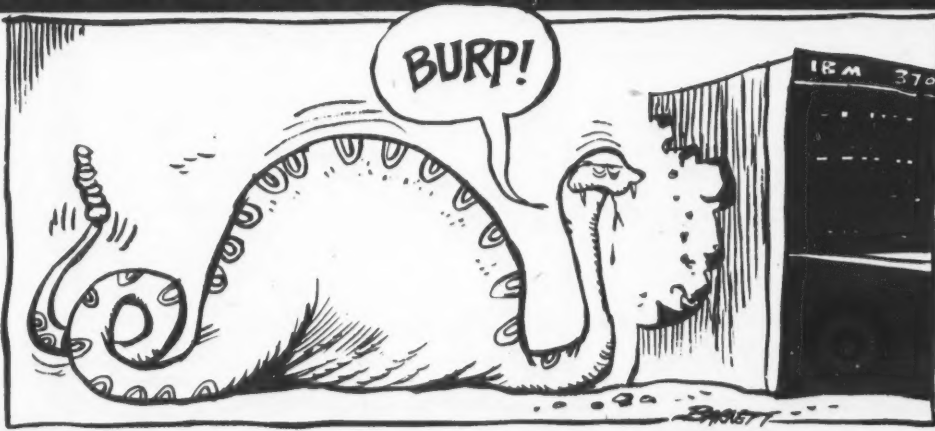
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Fairchild Host Eases Product Tests

CHERRY HILL, N.J. — A host system from Fairchild Camera and Instrument Corp. reportedly allows automatic test networks to concentrate on their main function — product evaluation — by freeing the networks of ancillary tasks like program development, report generation, data display and communications.

Described as a central data base that processes and analyses data from automatic test systems, the Integrator II provides five times more processing power than the Integrator I, from which it was updated, according to a spokesman.

Fairchild credited the performance

boost to the Integrator II's floating-point processor, fast Fortran processor and CPU, which consists of a Hewlett-Packard Co. 1000 modified with the company's microcoded instructions.

The floating-point unit reportedly executes single- and extended-processor operations in 4.9 and 6.2 microsec, while the fast Fortran processor is said to speed common Fortran routines by two- to 20-fold.

In addition to an 128K-byte CPU, the system incorporates up to 32 CRT terminals, an 800 bit/in. tape system, a printer and 19.6M bytes of disk storage expandable in 19.6M- or 50M-

byte increments to 400M bytes. The terminals can operate as far as 16,000 ft from the system through dial-up or leased phone lines, the source said.

Among its other hardware features, the Integrator II provides an interface for IBM 360 and 370 mainframes and connects to as many as eight concurrent test systems.

Applications software for the system includes data analysis and tester communications packages plus utilities.

A basic Integrator II costs \$153,000. It will be available in January from Fairchild's Test Systems Group at 1725 Technology Drive, San Jose, Calif 95110.

User 'Misled' Regarding Upgrade Costs

(Continued from Page 61)

\$63,000 — a sum many times greater than the vendor's original price quote and well beyond the financial reach of his 85-employee firm.

As a result, Hardman now finds himself unable to obtain the necessary configuration chip and thus effectively barred from acquiring the 3.0 operating system release, which he says could dramatically improve the performance of his badly overworked system.

Moreover, Hardman's company may be just one of many users who have been similarly victimized, knowingly or unknowingly, by Microdata's marketing policies. "I'm not alone," he warned. "A lot of other Microdata users are also being hurt."

Elaborating on his claim, Hardman accused the vendor of forcing its users to pay "unrealistically" high upgrade charges by preventing them from obtaining their expansion hardware on the open market, where memories and peripherals sometimes cost three to four times less than comparable Microdata equipment.

'Lock-In' Hinges on Chip

To a large extent, Microdata's alleged efforts to "lock in" its customers hinge on its configuration chip, Hardman added. Mounted on a Reality CPU's microprogramming firmware board, the configuration chip controls the amount of core memory, the number of CRT terminals and the amount of disk storage the processor can address.

When Microdata installs one of its systems, the vendor "sets" the accompanying configuration chip to accept only a user's existing configuration. If the user later wants to expand that configuration, he must obtain a new chip that can accommodate the additional equipment.

Unlike most other kinds of hardware, however, the Reality configuration chips are not available from independent sources. Thus, Microdata system users must return to their vendor for all their expansion hardware, or they won't receive the necessary configuration chips, Hardman claimed.

Of course, a headstrong user can still attach foreign memory modules and peripherals to his system if he wishes. But without the appropriate configuration chip, the system's CPU will be unable to address them.

Luckily for Microdata, Hardman added, few customers thus far have objected to the company's "wacky" sales practices — a fact he attributes

mainly to user naivete.

"Most users are inexperienced and don't realize they're being locked in," he said. "I'm astonished when I go to users group meetings and see how unsophisticated some of the people are. They're plinking down their money thinking they're buying their way to the future when in fact they're buying the privilege of spending exorbitant sums for their hardware in the future."

Microdata's Response

Responding to Hardman's charges, Microdata's Marketing Services Director Frank Robertson denied his company prohibits its users from going elsewhere for their expansion hardware.

"Of course we want to encourage our users to buy their peripherals from us," he explained. "We don't sell our operating system separately. So we can only make money by selling our software and hardware as a bundled system." Accordingly, Microdata provides its configuration chip free to users who buy all their peripherals from the vendor.

But this marketing policy does not "lock in" Microdata's customers, Robertson added. Users who insist on ob-

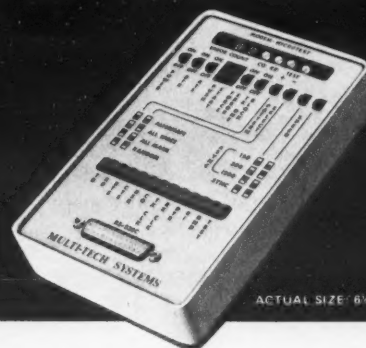
taining their expansion hardware on the open market can still do so. They must, however, pay Microdata a fee for a new configuration chip so that their CPUs will recognize the additional hardware.

Robertson also denied Hardman's charge that Microdata misrepresents its upgrade costs by neglecting to tell users about the price of its configuration chips. "I know for a fact that all our direct sales branches inform their customers about the full cost of our upgrade," he said. "And I assume our dealers do so as well, but I can't say for sure."

In other comments, Robertson questioned Hardman's motives in criticizing Microdata's marketing practices. "He's not just a casual Microdata user," the sales director said. "He's also a used Microdata equipment dealer who has invested a lot of money in his business. Now, because of the introduction of the configuration chip with the 3.0 release, he finds himself on the outside looking in."

Although Hardman admitted being a dealer of used Microdata equipment, he denied his business interests have prompted his complaints against the Irvine, Calif., company.

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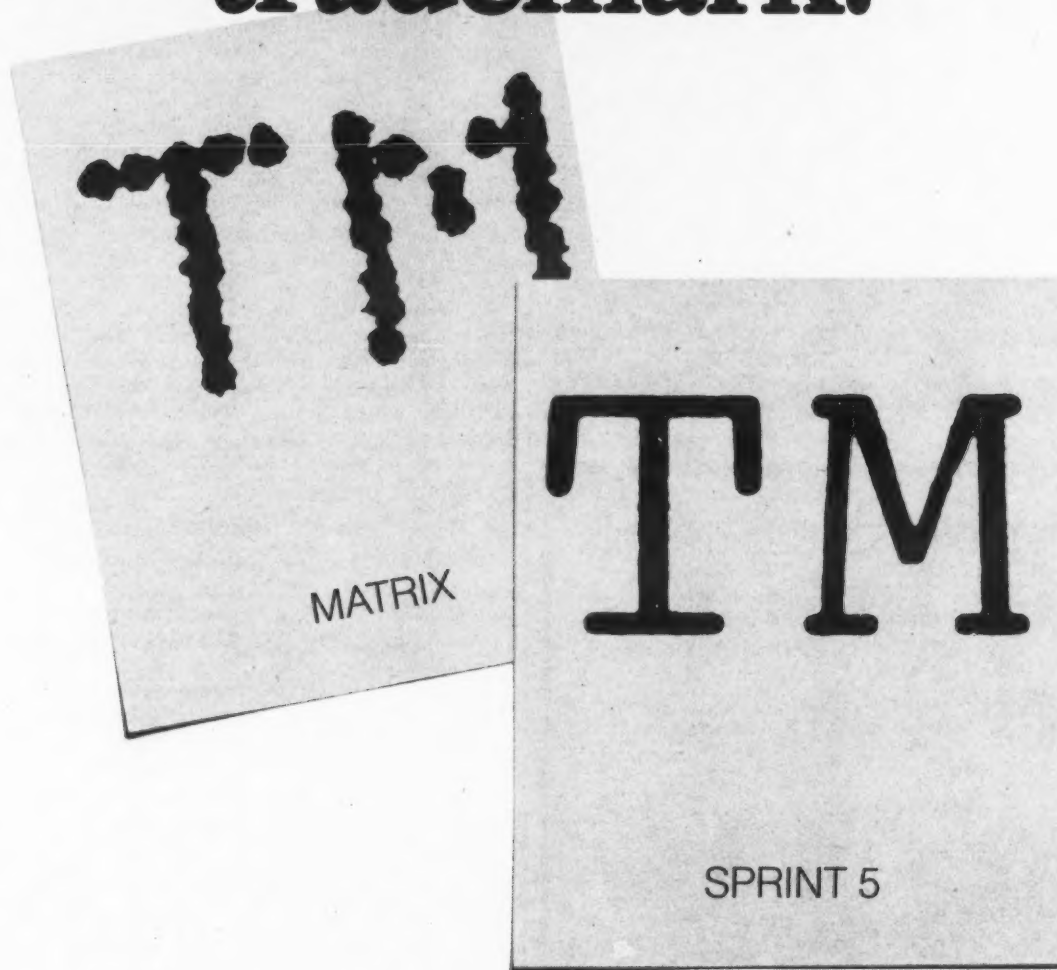
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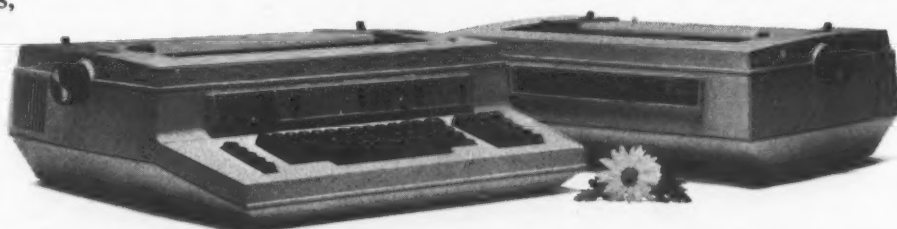
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Wang Offers Upgrade Paths

(Continued from Page 61)

ments, the minimum main memory for VS processors has doubled from 64K bytes to 128K bytes, and the maximum number of terminals the CPUs can support has grown to 32 — a 40% increase.

The company has also enhanced two of the three existing VS disk system models to allow them to accommodate up to 2.3G bytes of formatted storage, a spokesman said. Previously, only one of the disk units stored that much data, while the other two held a maximum of just 150M bytes.

In other VS series developments, Wang cut the price of a 64K-byte memory upgrade from \$6,000 to \$5,000 and the price of the 75M-byte 2265V-1 disk unit from \$20,000 to \$19,000.

In the MVP product line, the firm introduced the MVP-A processor chassis and a slightly modified version of the 2280 fixed/removable disk. In addition, the company quadrupled the MVP's maximum main memory capacity from 64K bytes to 256K bytes.

Taken together, these hardware additions and the accompanying enhancements increase the capacity and configuration options available to VS and MVP users and thus help ensure they will not outgrow their upward-expandable systems, the spokesman explained.

At the low end of the Wang product spectrum, the firm equipped its PCS-II desktop computer with a system disk multiplexing capability to produce the PCS-IIA, which can reportedly serve as an intelligent terminal for on-line hosts like the Wang 2200T, 2200VP and MVP.

Noteworthy Announcement

Of all the hardware involved in Wang's most recent product announcement, the single most important is probably the 2280 disk unit series, according to the spokesman. Positioned in the middle of the company's disk systems family, the 2280 series units are believed to be the only mass storage modules in their size class to offer both removable and fixed media.

In the VS series, the 2280 consists of three models: the 2280V-1, which stores a total of 30M bytes; the 2280V-2, which holds 60M bytes; and the 2280V-3, which accommodates 90M bytes. All three provide 15M bytes of removable storage, with the remaining memory residing on fixed media.

In the MVP line, the 2280 series also consists of three models, but they differ slightly from their VS counterparts in total capacity. The 2280-1 stores a total of 26.8M bytes; the 2280-2, 53.6M bytes; and the 2280-3, 80.4M bytes. Each model places 13.4M bytes of its total storage on removable disks and the rest on fixed media.

But despite the differences in memory capacity, both the MVP and VS versions of the 2280 series store 6,000 bit/in. and transfer 1.2M byte/sec with a 30 msec average seek and 6 msec track-to-track access.

The 2280 models 1, 2 and 3 cost \$19,000, \$21,000 and \$23,000, respectively, and will become available for shipment in January. The three VS versions of the 2280 series, by contrast, cost \$17,000, \$19,000 and \$21,000 and are available now.

Unlike their MVP counterparts, the VS 2280 models provide a companion

disk unit IOP, the 22V08. Intended as a replacement for Wang's VS 22V03 and 22V04 IOP, the 22V08 controls any combination of up to four 2280V or 2265V disk units. The 22V08 costs \$6,000 and, like the split-pack disk unit it supports, is available immediately.

Serial Workstation

Elaborating on its other recent VS series offerings, Wang credited the 2246S serial workstation with using a full upper and lower case Ascii character set to display 24 lines with 80 char./line.

Control for the 2246S workstation comes from the 22V07 workstation IOP, which reportedly supports any combination of up to 16 serial workstations or printers while operating as far as 2,000 ft away. The workstation itself costs \$3,200, while eight-port and 16-port versions of the accompanying IOP sell for \$3,000 and \$4,000 respectively.

Another recent VS series addition, the 2209V-2 tape transport unit, reads and writes at 75 in./sec and rewinds at 200 in./sec, the spokesman said. Capable of storing 800- and 1,600 bit/in., the 9-track unit provides read-after-write verification, automatically corrects single-track errors and comes with the 22V05-2 tape system IOP, which supports up to four 2209V-2s simultaneously.

The 22V05 costs \$4,000, compared with \$16,000 for the dual-density transport system.

Rounding out the latest VS line introductions, the 2256 series serial interface allows users to connect their VS processors to any other 2200 series CPU, including the MVP, T and VP versions, the spokesman said. The interface costs \$1,200.

Desktop Unit Enhanced

Elsewhere in Wang's 2200 series product line, the PCS-IIA incorporates a processor with a Basic interpreter, 8K bytes of user-addressable memory expandable to 32K bytes and 42.5K bytes of operating system memory.

Like the PCS-II from which it was derived, the latest addition to Wang's desktop computer family provides 89.6K-byte diskette units, a 1,024-char. CRT screen, keyboard with numeric keypad and 23 special function keys for data entry and system control.

Unlike its sister system, however, the PCS-IIA offers no multiprinter option. Instead, the system replaces that feature with a disk multiplexing capability which permits the desktop unit to share a data base with larger host processors, the spokesman explained.

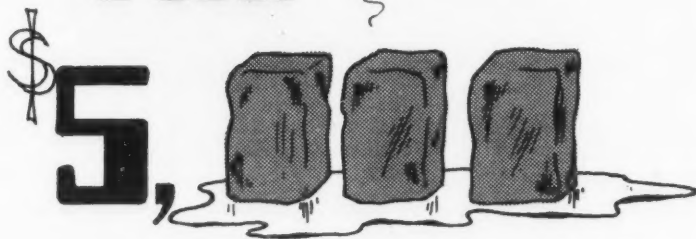
Users can upgrade the PCS-II to the PCS-IIA in the field merely by inserting the appropriate multiplexer boards, he added.

Slated to become available by the end of this month, the PCS-IIA costs \$4,800 for a minimum configuration.

The MVP-A chassis, meanwhile, incorporates a built-in power supply and must be configured with all subsequent 2200MVP orders calling for a 2280 disk system and more than 64K bytes of central memory, the source said. The chassis costs \$500 and, like all of Wang's other recent hardware additions, is available from the vendor at One Industrial Ave., Lowell, Mass. 01851.

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(Continued from Page 61)

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Before the mini's acquisition, LeQuatte's business had grown to the point where he needed new personnel. "The computer alleviated that need," he recalled. "If I had been working with the proper number of personnel, I would have been able to cut back on people."

Family Profiles

LeQuatte Pharmacy's data base contains a profile of each family he supplies with prescriptions. When a patient brings in a prescription to be filled, the pharmacist dials a telephone number to access the individual's family profile, which indicates each patient's identification (ID) number.

By inputting the patient ID number and pushing the "Transmit" button, the pharmacist retrieves a "drug entering screen" on a CRT terminal. Using mnemonics, he then enters a drug name and dosage amount, the number of refills available to the patient, the doctor's initials or three letters of his name and the directions for the patient.

The machine produces a label automatically, prices the prescription and prints a receipt. "And - zap! - it's ready to bill on a billing dump at the end of the day," LeQuatte said.

An added benefit of the system is a doctor-developed drug-to-drug interaction program. "If there are two drugs that will interact unfavorably or if a patient has an allergy to a certain drug, a message will appear on the screen," LeQuatte explained.

'Downgrade' Planned

LeQuatte's configuration consists of a 64K-byte Honeywell Level 6 Model 33 minicomputer and two 10M-byte disk units offering 5M bytes of fixed and 5M bytes of removable storage. That equipment, installed in late August, will give way later this month to a Model 23 mini and a 16M-byte cartridge disk unit with 8M bytes of fixed and 8M bytes of removable storage, according to Richard Pilarczyk, president of GCC, which will install the replacement system.

The Model 33, Pilarczyk said, provides more power than LeQuatte's ap-

plication requires and is not part of the package offered by GCC.

It sufficed at the LeQuatte Pharmacy, however, until the Model 23 became available.

LeQuatte's configuration also includes a 120 char./sec printer and two Honeywell VIP 7200 CRT terminals in contrast to the GCC package, which provides just one terminal.

The only problem LeQuatte has experienced with the equipment involved a faulty disk unit, which Honeywell people fixed. "They don't know to this day whether [the problem] was caused by something in shipping or whether something was manufactured improperly," LeQuatte said.

Diskette for Micros Offers Double-Density Recording

TORRANCE, Calif. — A 5.25-in. diskette that uses double-density recording to hold up to 200K byte/surface reportedly forms the heart of a minifloppy disk unit from Vista Computer Co.

In addition to the hard-sectored recording medium, the V200 diskette system incorporates a disk drive, a dc power regulator board, internal power supply, I/O cable and S-100 bus controller card that supports up to three double-density, double-sided drives, according to a Vista spokesman.

Capable of operating with any 24K-byte Zilog, Inc. Z-80 or Intel Corp. 8080-based system, the V200

also provides system software consisting of Digital Research, Inc.'s CP/M disk operating system and a choice of either a standard Basic E compiler or an optional CBasic compiler.

With the CP/M operating system, users can store up to 64 dynamically allocated files on one diskette, the source noted.

Other features reportedly available with the V200 include program loading and dumping.

A V200 package, including hardware and software documentation, costs \$699 and is available from Vista's Department P2, 2807 Oregon Court, Torrance, Calif. 90503.

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Ship Designer On Course With Mini System

GALVESTON, Texas — "We were totally dependent on a system completely out of our control. Our time-sharing cost alone was from \$5,000 to \$6,000 per month per job. The cost was high enough to prohibit future application development, unless required by contract."

With those words, Dennis K. Medler, director of computer-aided design at a ship engineering firm, explained why his company switched about a year ago from a batch-oriented service bureau to an in-house, interactive minicomputer system.

Under the time-sharing service, the firm — Designers & Planners, Inc. — used a numerical control (NC) system

to design and build parts for vessels ranging from sailing yachts and tug boats to destroyers and tankers. Known in the shipbuilding trade as "lofting," the ship-designing process consists basically of drafting a preliminary structural blueprint and then converting that design into templates, or molds, from which finished ship parts are eventually produced.

But when control problems and excessive costs made the service bureau no longer suitable for lofting, Designers & Planners analyzed the available small- to medium-scale computer systems and selected a Model 400 system from Prime Computer, Inc.

Power, virtual memory and ease of

operation were the factors in the system's selection, Medler said. "We needed a system large enough to easily convert our large programs with no segmentation. Prime's operating system was flexible enough to let us merge our entire program — up to 50,000 lines of code for one scientific application alone — with no overlays and no segmentation," he added.

Conversion took only half of the expected 10 months, largely because of the system's Fortran software, which proved "easy to work with," Medler said.

Besides the 512K-byte CPU, the Model 400 system incorporates a 356M-byte disk unit, 600 line/min

printer, 300 card/min card reader, 10 Perkin-Elmer Corp. CRT terminals, paper tape reader/punch unit and a Tektronix, Inc. interactive graphics terminal.

Since its installation, the system has allowed Designers & Planners to add applications "to a degree we never could have done using the batch system," Medler said. "We can perform such calculations as damage stability, longitudinal strength, stress analyses and weight estimates."

The company is also considering installing a communications network between its Galveston office (where all the NC lofting equipment is located), the New York corporate headquarters and its office in Washington, D.C. This proposed distributed network would let the firm develop computer lofting services at all three locations.

Norwegian Software

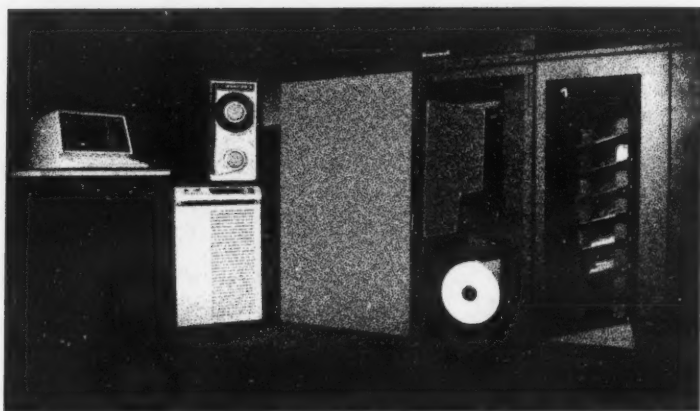
Designers & Planners uses Autokon 71, a shipbuilding software system developed in Norway, to create lofting contours, augmented contours, design parts and production parts. A complete geometric description of each part is stored to create a data base from which the firm can ultimately make "nest-burning tapes" that ensure efficient use of metal by cutting down on the amount of leftover scrap.

Using the Autokon 71 programs converted to the Prime system, the shipbuilding firm can produce an exact mathematical representation of a vessel. The next processing step mathematically fits longitudinal curves such as seams, edges, decks and girders to the frame. Size, shape type and cutout configuration information are stored in the data base.

When all necessary information has been entered into the system, drawings are made using an NC drafting machine that accesses the CPU's plot file. The machine then produces a final line drawing and a body plan.

With lofting or designing complete, Designers & Planners designates and stores all parts, punches the final NC tape and sends it with a marked-up drawing to the burn shop.

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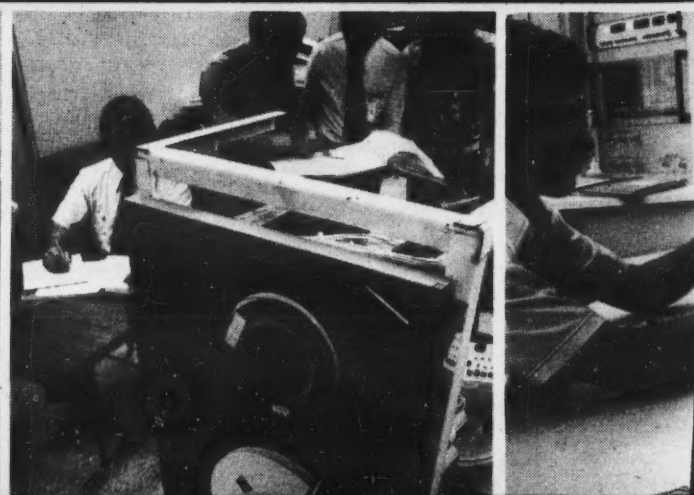
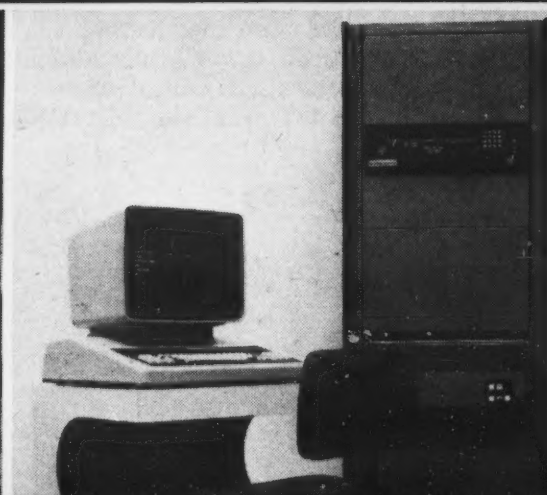
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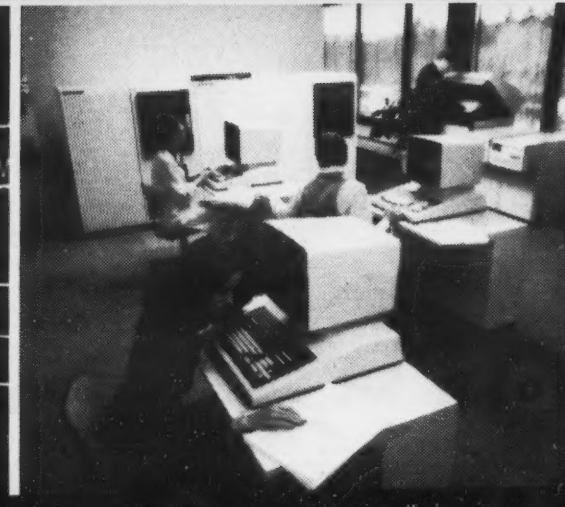
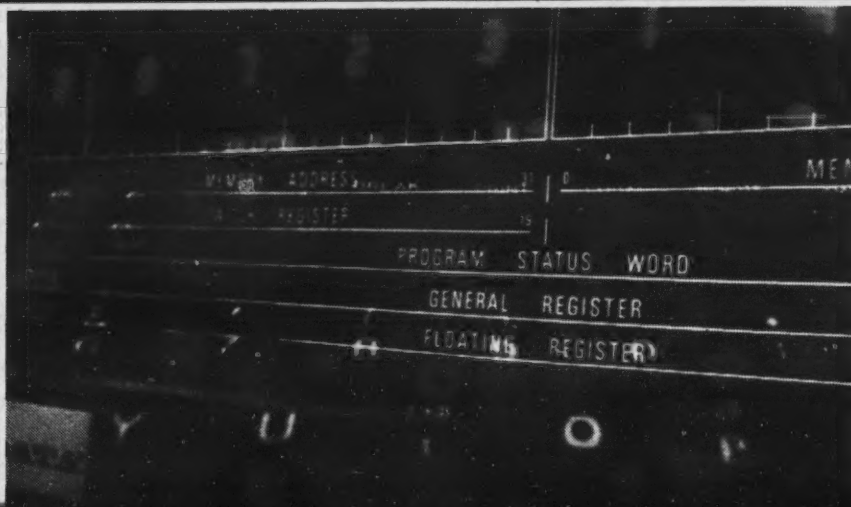
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Mini Points Out Excess

Distributor Cuts Surplus Stock by \$100,000

MEDFORD, Mass — A chemical distributor here cut \$100,000 of inventory surplus after a minicomputer-based system helped uncover that much excess stock.

"In fact, one of our major vendors thought we were giving up his line when we dropped from a truckload per week to one every three weeks," the firm's president, Larry Liebman, recalled.

The user, Doe & Ingalls, Inc., previously used a card-based inventory control system to keep track of the 2,300 different items stocked in the firm's 24,000 sq-ft warehouse. But with 50 to 60 orders and several hundred items being shipped each day, the firm eventually encountered difficulties with the manual system.

Though basically adequate, the system entailed so many control steps that Liebman's office staff of five could not keep up. With a goal of one-day service to 80% of Doe & Ingalls' more than 600 regular customers, the manual system simply fell short of expectations.

It was generally assumed to take three weeks to restock after orders were placed with a vendor but, in practice, up to three months frequently elapsed between the order and resupply.

For this reason, Liebman's biggest problem was "not knowing what we had out on the floor." Some items were overstocked while others were sold

out.

Because there appeared to be no simple way to expand the card system to meet the company's needs, Liebman decided to automate not only to meet his immediate needs, but also to realize his projected goal of doubling sales within three years.

Three-Month Search

Hoping to find a ready-made inventory control package, Liebman spent more than three months evaluating products from IBM, Digital Equipment Corp., Litton Industries, Inc., NCR Corp. and Wang Laboratories, Inc. While all the systems were competitively priced, most lacked the flexibility to work within the context of Doe & Ingalls' manual system and required new procedures and forms, Liebman noted.

So the Wang system got the nod when Liebman learned it could be programmed to identically match Doe & Ingalls' manual records and systems. "The other computer manufacturers wanted us to change our forms, the way we did things, the way we obtained our reports," Liebman said. "With Wang, we didn't have to change anything when we computerized."

Last January, Liebman installed a Wang minicomputer system with customized version of the manufacturer's General Business System (GBS) software package, acquired through Data Processing Services, Inc. Doe & In-

galls' package not only controls inventory, it also prints orders and shipping documents, writes invoices and prepares management reports.

When an order is received, data is taken over the phone and logged onto a standard form. Order entry data includes customer number, product number, discount code and quantity.

Keying the product number into the machine summons a CRT display depicting case price and cost, unit selling price and unit cost, chemical nomenclature and package type and size. With such information, the system prints an order with appropriate prices on a four-part carbon form. Shipping and picking papers are generated as part of the same package.

Doe & Ingalls' system consists of a 32K-byte Model 2200 CPU, a 10M-byte disk unit, 240 line/min printer and one CRT terminal.

During most of a typical working day, the machine is available for taking orders as they are phoned in. Between order entries, operators do a number of other functions such as posting cash, inventory control or receivables accounting.

The opening and closing periods of each business day are devoted to DP tasks like the production of daily invoices. The invoicing that used to occupy one staff member full time is now completed in 80 minutes, Liebman noted. During these periods, the system also writes invoices, generates

back orders, completes the invoice register, updates sales analyses and generates a commission report.

At month's end, the system prepares a sales report listing customer-by-customer profit margins and supplying sales activity for the month- and year-to-date, he said.

With the modified GBS software, Liebman can display the last 21 transactions for any given product — a feature from which an average demand can be computed for purchasing and stock forecasting.

Data for Clients

The system also selectively prints quarterly sales activity reports that show customers what they have purchased from Doe & Ingalls.

In addition, it retrieves by product a listing of buyers for any given period. "This is of vital importance when a manufacturer issues a product recall," Liebman pointed out.

While Liebman finds it difficult to assign a dollar value to his mini's performance, he claimed that much of its value lies in "the ease it has created in the office and warehouse, as well as the increased comfort and boost in morale" because the atmosphere is no longer rushed and hectic.

Liebman does not foresee an immediate need to expand the system. "We can do three or four times the business with this machine and not have to change it," he said.

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Los Angeles	Feb 28-Mar 2, 1979	Chicago	June 18-20, 1979

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	Mar 12-16, 1979		June 4-8, 1979
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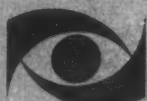
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Synthesizer Based on MPU Portable Unit Offers Speech to the Mute

By Ann Dooley
CW Staff

E. LANSING, Mich. — Victims of stroke or cerebral palsy and other people unable to speak clearly can now be helped to talk — some for the first time in their lives — through a portable, microcomputer-controlled voice synthesizer system.

The unit, which is reported to be the first of its kind, can be attached to a wheelchair so its user does not have to remain stationary or near a DP center or computer room. "That is the beauty of using a microcomputer system — it allows the user to move around at will," John B. Eulenberg, professor of computer sciences and linguistics at Michigan State University (MSU), pointed out.

Eulenberg, who is co-director of the MSU Artificial Intelligence Laboratory, designed the portable system in cooperation with Prof. Morteza Rahimi. The system was developed for James Renuk, an MSU student who has cerebral palsy and cannot command his vocal tract to produce speech.

Although the system is being tested only by Renuk at the present time, a plan is being formulated to use the system to help similarly handicapped pupils in a number of Michigan schools.

The "talking computer" is actu-

ally a Handivoice portable speech synthesizer from Federal Screw Works. Controlled by a Motorola Corp. 6800 microprocessor, the Handivoice incorporates Federal Screw's Votrax audio response system.

The system allows the user to access an indefinite number of pages of information through a 17-key keyboard. A modified Heath Corp. Heathkit TC3400 microcomputer incorporated in the system interfaces with specially designed read-only memory (ROM) and uses the 6800 language.

The system utilizes 16K of erasable programmable read-only memory (Eprom) with a Model 2716 Intel Corp. chip. The synthesizer uses 8K of ROM and the system itself rises 16K of ROM to operate.

(Continued on Page 72)



Jim Renuk, a Michigan State University senior in food science from Westland, Mich., uses his portable voice synthesizer system in a conversation with John B. Eulenberg, professor of computer science and linguistics. Renuk has cerebral palsy and cannot speak.

Digitenn's Options Now Standard

UNION, N.J. — Tenney Engineering, Inc. has made several previously optional performance features into standard features on its Digitenn microprocessor programmer.

The changes include 51 program segments that permit a lengthy, nonrepetitive program cycle with programming up to 51 steps, seven event switches offer-

ing time-related switch closures, a battery backup system and compatibility with teletypewriter tape or other Ascii input.

Digitenn now also offers a standard power-on program-erase switch that permits total shutdown and optional compatibility with an IEEE bus.

The cost of the Digitenn has not been increased with the addi-

tion of these features. A single-channel Digitenn costs \$1,575 and a dual-channel version costs \$1,875.

Digitenn is a digital display, push-button microprocessor programmer that automatically signals environmental test chamber controls to perform time-related temperature, humidity and altitude programs as a one-parameter test or to perform any two parameters simultaneously.

Tenney Engineering is at 1090C Springfield Road, Union, N.J. 07083.

Controller Links Disk, S-100 Bus

PHOENIX — The SMC 100 controller now available from Konan Corp. interfaces storage module technology disk drives to microcomputer systems based on the S100 bus.

Using the SMC-100, 64K bytes of data can be transferred in less than 350 msec because of a direct memory access scheme used on the controller, the firm said. Data is transferred in blocks using two machine cycles per byte.

Each sector is fully buffered on the controller to eliminate disk and CPU timing restraints, according to the firm.

The controller uses I/O commands for all functions. A driver and IPL read-only memory

(ROM) is available which, when accessed with descriptors, performs the indicated disk operations along with automatic error recovery and multiple sector transfers.

Data Integrity

Data integrity is assured by automatic cyclic redundancy check (CRC) generation and checking. The SMC-100 can be used with or without formatting; if the on-board ROM driver is used, the format generation and checking is transparent to the user.

Each controller can accommodate up to four drives providing 14M to 1.2G bytes of storage. The SMC-100 costs \$1,650 from

Konan at 1434 N. 27th Ave., Phoenix, Ariz. 85009.

Eight Colors Available

DOTHAN Ala. — Intercolor Corp. is offering the 8070 Series I business system, which incorporates a 19-in. CRT screen with eight background colors and a separate keyboard with 192 codes with an 8080A MPU featuring 15K bytes of read-only memory and 16K bytes of random-access memory.

The system has keyboard-selectable transmission rates of 110- to 9,600 bit/sec, a 48-line screen format with 80 char./line, one RS-232C serial port, bidirectional impact matrix printer and dual 8-in. floppy disk drive with 591K bytes.

The system runs under Microsoft Business Basic, and a payroll program can handle up to 500 employees, the firm said.

The 8070 costs \$7,000 from Intercolor Corp., Suite 4, 115 North Bell, Dothan, Ala. 36303.

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MICROCOMPUTING

8002 Users Offered Fortran-80

ALBUQUERQUE, N.M. — Tektronix, Inc. 8002 users can now take advantage of Fortran-80 from Microsoft, Inc., which now operates under the Tektronix Disk Operating System (Tekdos).

The Fortran-80 package allows development and debugging of programs written in Fortran on the 8002 microprocessor development system.

The compiler can be used to develop 8080A systems that employ the Intel Corp. 8080A, 8085A and Zilog, Inc. Z80 chips.

The Fortran-80 compiler is accompanied by an assembly language development package that includes a relocating assembler and linking loader. Object code is generated in binary relocatable modules which can be linked to separately compiled Fortran or assembly modules.

The Fortran-80 compiler for the Tektronix 8002 costs \$500 from Microsoft, Suite 819, 300 San Mateo N.E., Albuquerque, N.M. 87108.

OSI Users Get Group

NEWTON, Mass. — Owners and all those interested in Ohio Scientific, Inc. (OSI) microcomputers can share information, applications and software through an independent group formed by the Newton Software Exchange.

Many owners experience the same problems and make the same mistakes, and this group hopes to help users avoid many of those difficulties, according to Jack C. Star, president of Newton Software.

Annual dues are \$5, which includes a monthly newsletter from P.O. Box 518, Newton, Mass. 02158.

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Utility Supports TRS-80

FULLERTON, Calif. — Faulk & Associates Software is offering a utility called SEQDMP that will reportedly read and dump any track and sector on the TRS-80 mini-disk.

The program will dump both hexadecimal and Ascii using 16 bytes across, grouped into 4-byte increments. The program can be used to dump the directory, files or random tracks and sectors and will bypass any password protection that may be placed on a given file, the firm said.

The program requires 2K of memory and will run on a machine with at least 16K.

SEQDMP can provide hard copy if a printer is attached and it is ready when the program starts to format a sector. It uses its own disk access code, so it is independent of disk operating system releases.

SEQDMP costs \$15.95 (with a 6% sales tax for California residents) from Faulk & Associates Software, 2531 E. Commonwealth, Fullerton, Calif. 92631.

Talking System Built

(Continued from Page 71)

The unit is programmed with three modes of speech: whole phrases; individual words; and sounds, or phonemes. This phrase book of language is placed on a ROM and includes nearly 1,000 stored words, phrases and sounds.

Symbols Translated

The Heathkit microcomputer is programmed to access sequences of these words and transmit them to the voice synthesizer so Renuk can communicate.

According to Eulenberg, the system has the ability to construct long and involved sentences and words. If a word is not included in the stored dictionary of words, the system can construct the word by putting the correct sounds together.

To use the system, Renuk punches a symbol on the keyboard into the microcomputer, which is programmed to decipher the code. The system then translates the symbol into matching audible sounds using the Handivoice.

The system works very well, according to Eulenberg. Research is now concentrating on speeding up the rate of speech.

The automated processing of the sounds takes only seconds, but the rate of speech is dependent on how fast the user can construct the words going into the buffer so they can be sent out in vocal speech patterns, he explained.

In order to speed up the speech process, the physical interface — in this case the keyboard — must be modified so it will be easier to operate. Artificial intelligence research will ideally progress so a system can anticipate what the user is about to do and "navigate in language space," Eulenberg said.

Although the speech is slow and sounds "unhuman," it does give people who never before had an opportunity to communicate a way to speak, Eulenberg said. Most people with speech problems attempt to communicate in writing and unless the recipient has

knowledge of the problem, communication is difficult.

Most of the developmental research was performed on a Control Data Corp. 6500 system. Many of the programs were written by a member of the MSU research staff who is also handicapped. Much of the work was done by Jerome Jackson, a blind programmer and Renuk, the student who is unable to talk. The whole thing worked beautifully, Eulenberg said.

Renuk recently demonstrated the system at a U.S. Governmental Interagency Conference in Washington, D.C. This marked the first time such a communication system was used to deliver an extended speech and it went over very well, Eulenberg said.

Before converting to the Motorola system, the MSU lab used an Electronics Products Associates, Inc. 68 microcomputer with a Votrax VS-6 voice synthesizer that had to be plugged into the computer room wall, limiting movement.

Bored with Board

When Renuk was outside the room, he carried a language board consisting of about 100 words and phrases to which he would point in order to be understood. This was extremely cumbersome, however, and taxed both Renuk and the person with whom he was attempting to communicate, Eulenberg said. It took about a year and a half before the portable system was developed.

Although few research centers around the country are currently engaged in this kind of research, it is a growing field, Eulenberg said.

One line of research seeks to find ways of using electric signals to determine muscle activity and then using a microcomputer for pattern recognition and reconfiguration by recognizing different muscle signals. The user would only have to think about moving a muscle to activate the muscle neurons and thought processes, which the system could pick up and convert, he said.

Judge Won't Dismiss Charges CFI Suit Against Decimus Still Stands

By Marcia Blumenthal
CW Staff

NEW YORK — A federal judge here has refused to dismiss claims brought by Computer Finders, Inc. (CFI) last April against Decimus Corp., a subsidiary of Bankamerica Corp., and two of its senior executives.

At the heart of the suit are CFI claims that John Margo, Decimus president, and John M. Mickel, executive vice-president, deliberately started an investigation into vague allegations of bribery on CFI's part and used those allegations as an excuse to cease paying monthly contract fees to CFI.

The suit charges Margo with starting the investigation because he felt that CFI was

too small a company to be collecting the amount of fees agreed upon in written contracts between the two companies.

Since the action's filing, Mickel has become a senior vice-president of the Bank of America, according to court documents.

CFI is a small leasing company whose specialty is arranging the leasing and subleasing of computers. Decimus is also in the leasing business and its various leasing programs involve computers worth more than half a billion dollars, the suit stated.

Between 1974 and 1976, according to the complaint, CFI arranged a computer leasing program in which General Electric Credit Corp. (Gecc) agreed to purchase up to \$200 million worth of new IBM computers which

were to be leased to Decimus, then subleased by Decimus to other companies. Gecc also agreed to pay Decimus a monthly "sublease administration fee" for each sublease Decimus arranged.

In January 1976, the suit continued, Decimus and CFI entered into a written contract under which Decimus agreed to pay CFI an origination fee and an ongoing fee for each lease negotiated. CFI had certain rights to participate in the remarketing of the computers once the leases expired, according to one of the suit's claims.

Fee Payments Stopped

A total of 17 computer subleases were executed under the Gecc program with Decimus as sublessor and various other companies as sublessees. Decimus paid CFI the fees agreed upon in their written contract until about August 1977.

Last April, when the complaint against Decimus was filed, Decimus had not paid CFI since August 1977. As of Nov. 1, the fees due CFI from Decimus exceeded \$750,000, the suit contended.

Just prior to the cessation of payments to CFI, according to the CFI filing, Decimus informed CFI it was conducting an investigation to find out whether "improper payments" had been made by CFI to certain Decimus employees in connection with the negotiation of the Gecc program. The investigation was prompted by a Decimus employee's statement that key Deci-

(Continued on Page 84)

Revenue Act Expected to Bring Capital to Technology Firms

PALO ALTO, Calif. — The recent signing of the Revenue Act, which reduced the maximum capital gains tax from 49% to 28%, is expected to result in an infusion of capital for high-technology firms, according to members of the American Electronics Association's (AEA) capital formation task force.

However, the reduced capital gains taxes will cause an estimated \$2 billion shortfall in net capital gains tax revenue, according to estimates of the U.S. Congress' Joint Committee on Taxation.

The government's figures are based upon the consensus that about \$3.8 billion in reduced tax revenue from tax cuts would be offset by about \$1.8 billion in additional tax revenue gained from new capital formation.

However, the AEA thinks the revenue loss will not be as high as government figures indicate. According to an AEA-commissioned study made by Chase Econometrics, tax revenue gains and losses would just about even out with the maximum capital gains tax rate at 25%.

In commenting on the Revenue Act, Dr. Edwin V.W. Zschau, chairman of Systems Industries, Inc. and head of the AEA capital formation task force, said AEA is encouraged by the government's growing recognition of the necessity of stimulating risk capital investment.

"Until this year, Congress did not under-

stand the connection between risk capital investment and job creation," Reid W. Dennis, a venture capitalist and AEA task force member, noted.

Dennis also pointed out that AEA's testimony at congressional committee meetings concentrated on showing members of Congress that young, high-technology companies generate jobs at a much faster rate than more mature companies.

AEA's survey showed that it takes

(Continued on Page 84)

Technology Transfer Service Technotec Sale to Soviets OK'd

By Marcy Rosenberg
CW Staff

MINNEAPOLIS — Control Data Corp. recently received U.S. government approval to make available its computer-based technology transfer service, Technotec, to the USSR, Eastern Europe and Yugoslavia.

Under a license agreement with the U.S. Department of Commerce, CDC will provide the Technotec data service from a CDC Cyber 172 computer located in Brussels, according to Robert D. Schmidt, executive vice-president. The computer will not be connected to any other system, ensuring that users access only Technotec data and no

other information.

The U.S. Commerce Department stipulated that users not be able to interface directly with the computer, that it receive reports of each transaction within 60 days and that no data be contained in the data base that would require a validated U.S. license for transfer.

Users will be able to request information through a terminal connected over telephone lines to CDC's Brussels center, where a CDC western representative will screen the request, query the computer and transmit the information to the user terminal,

(Continued on Page 80)

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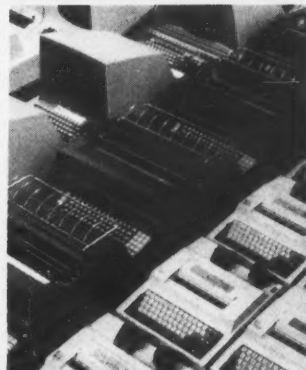
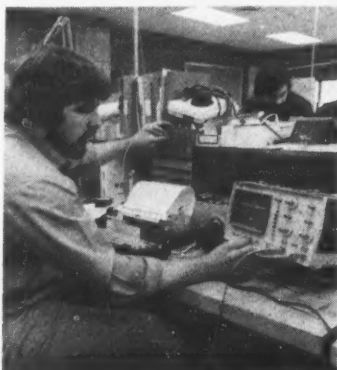
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U.S., IBM Trying 'Narratives' to Speed Trial

By Connie Winkler
CW Staff

NEW YORK — The U.S. vs. IBM antitrust trial is speeding up at the same time it is grinding to a halt. That paradox has developed because both IBM and the Justice Department are trying a new technique, narrative statements, for the introduction of direct testimony from IBM's witnesses.

In order for the statements to be prepared, the court will go to a three-day, Tuesday-through-Thursday calendar for the next month.

IBM lead attorney Thomas D. Barr estimated the written narratives could save 150 to 250 trial days, but he asked for a 30-day hiatus to get the procedure organized. Judge David N. Edelstein rejected the hiatus but agreed to

the three-day week.

Edelstein is optimistic about the narrative technique, which has been tried successfully with two witnesses, IBM controller C. Arthur Northrop and Dr. H. Dean Brown of Zilog, Inc., whose testimony has just been completed.

The judge also agreed to another experiment in which the narrative would be presented in lieu of the deposition, when witnesses are questioned about the nature of their testimony. The first witness with which this will be tried is Jane Cahill Pfeiffer, who was to be deposed in early December. Pfeiffer, a successful IBM executive and former IBM corporate director of communications, was recently named chairman of the board of RCA.

Lead government attorney Robert S.

Staal objected vigorously that the depositions not be discontinued entirely. And he refused to give up the government's prerogative to subpoena documents after the introduction of the narrative statement.

In the robing room chambers where this was discussed, Staal also suggested that the narratives were just a tactic by Barr to delay the trial. Barr vigorously objected that it is important to his client to finish the case as soon as possible.

Barr was much more enthusiastic about the use of the narratives and characterized them as the first real opportunity to expedite procedures.

Whereas IBM direct testimony could have taken a week or longer, with controller Northrop it took less than five

minutes. Northrop's direct testimony consisted of the introduction of 18 written pages and 11 exhibits. With Brown, who has extensive experience in the computer industry dating back to the Atomic Energy Commission, the direct testimony took 27 pages supplemented by a half-day of live testimony, which was requested by government counsel.

Barr's only problem with the narratives was that he did not have the staff to take them and write them while at the same time attending depositions, producing documents and carrying on the case in court.

However, despite the rhetoric about expediting matters, the fact remains that IBM has more than 50 witnesses yet to call, although that number has been reduced from about 150.

It took the government three years to present 54 witnesses. IBM, despite an August recess, has already called 10 witnesses.

Supershorts

Memorex Corp. has signed a license agreement with Enertec, Paris-based manufacturer of instrumentation magnetic recorders, giving Memorex the right to manufacture and market data cartridges worldwide using Enertec patents. The agreement also grants Memorex exclusive rights for one year to produce 1/4-in. cartridges.

Computer Devices, Inc. has set up a marketing operation in Paris to distribute its Miniterm line of portable and desktop terminals and computers in Europe and the UK.

Network Systems Corp. has signed Tesdata Systems Corp. as exclusive distributor and service organization in Europe and the Middle East for Network Systems' Hyperchannel computer interconnect networks.

IBM has declared a regular quarterly cash dividend of \$2.88 per common share, payable Dec. 9 to holders of record Nov. 8.

Computer Micrographics, Inc. plans to spend nearly \$1 million for new equipment at its nationwide service centers, bringing the firm's total capital investment over the next two years to more than \$2 million.

Indeserv, an association of independent service companies that provides contract field service for DP and communications equipment, has added service capability in Raleigh, N.C.; Billings, Mont.; and Portland, Maine.

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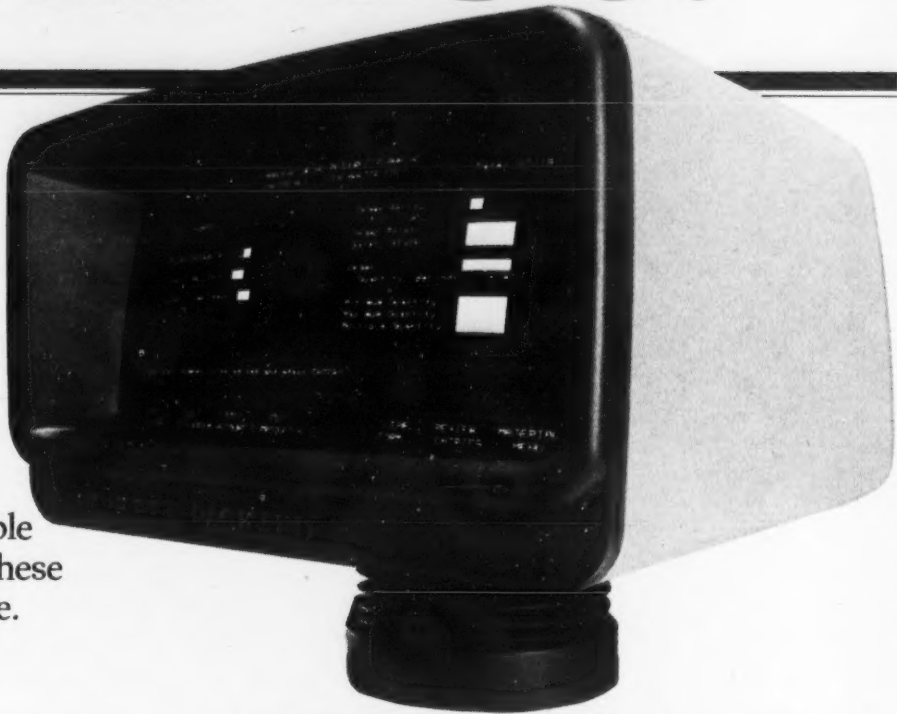
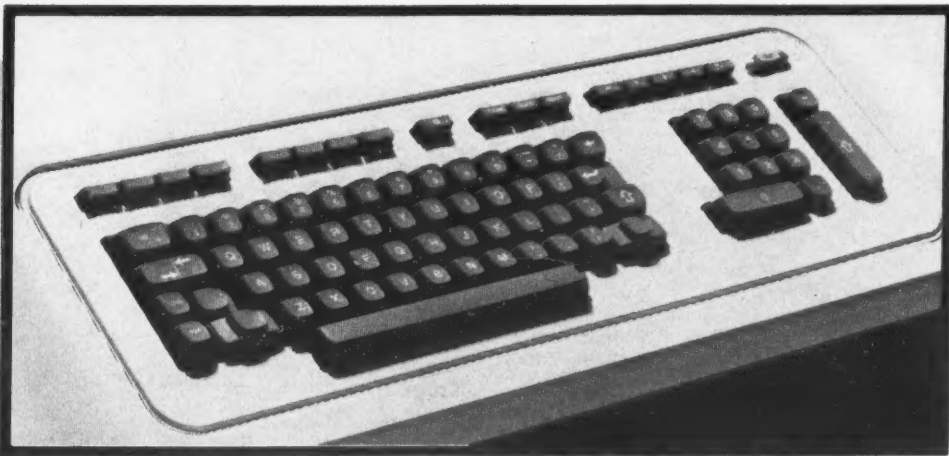
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Prices are U.S. list.

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Japan's General-Use CPUs Seen Tripling by '85

TOKYO — At the end of 1976, there were 38,927 general-purpose computers installed in Japan, according to statistics compiled by the Ministry of International Trade and Industry (MITI) here.

And MITI estimated by 1985 the number of installations will increase nearly threefold, climbing to 107,000 units, representing about a 12% annual growth rate in the use of general-purpose computers in Japan.

In addition to these general-purpose systems, MITI reported 11,094 minicomputers in use, and the Japan Electronic Industry Development Association noted that 8,000 process control computers were in service.

Yoshio Honda, general manager of Fujitsu Ltd.'s California office, estimated the installed base in Japan at the end of 1976 to be worth about \$12.5 billion.

According to breakdowns supplied by MITI (see chart),

GENERAL-PURPOSE COMPUTER SYSTEMS IN USE IN JAPAN AS OF DECEMBER 31, 1976 (Figures Supplied by MITI)				
Unit Size	Domestic Products	Foreign Products	Total	Percent Of Grand Total
Large \$830,000-\$1.67 Million	755	391	2,179	5.6%
\$1.67 Million and Up	492	541		
Medium \$130,000-\$330,000	2,894	865	6,082	15.6%
\$330,000-\$830,000	1,723	600		
Small \$33,000-\$130,000	8,235	2,788	11,023	28.3%
Very Small Up to \$33,000	10,985	8,658	19,643	50.5%
Grand Totals	25,084	13,843	38,927	100%

foreign-made computers account for about 36% of the installed base, with the dollar value of foreign-made units amounting to 43.2% of the total worth of general-purpose

computers.

From 1975 to 1976, the monetary value of general-purpose systems installed grew by 15.5%. But MITI noted that the value of Japanese-made units grew by 18.3% while the value of foreign-made units grew by

only 10.6%.

MITI's figures show that foreign-made units are utilized more frequently in the large-scale and very small-scale categories.

Five industries accounted for 63% of general-purpose com-

puter usage. Following are the unit breakdowns for the five largest industry users: the wholesale, agency, brokerage and retail sectors accounted for 12,736 units; the financial sector, 4,371 units; the service sector, 2,851 units; cooperative and other associations, 2,149 units; and the electrical machinery sector, 1,925 units.

The financial industry is the top spender for general-purpose computer equipment, MITI reported, with total installations valued at about \$2.4 billion. The wholesale, brokerage, agency and retail industries follow with total equipment valued at about \$1.4 billion.

Aside from the compounded annual growth of about 12% forecast for general-purpose computers, MITI predicted that on-line terminal equipment growth will top 23% annually until 1985.

Although compiled annually, the 1976 statistics are the latest figures available from MITI.

168

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PCC Planning to Acquire Part of Philip's Assets

LOS ANGELES — Pertec Computer Corp. (PCC) and North American Philips Corp. have signed a letter of intent whereby PCC would acquire certain assets of Philips' small business computer operations in the U.S.

Part of the letter of intent stipulates that PCC would provide service and software support in the U.S. for the small business computers sold by the Data Systems Division of Philips Business Systems, Inc.

Under the proposed seven-year agreement, Philips would

transfer to PCC the maintenance obligations for the installed base of systems sold by the Data Systems Division as well as associated software and spare parts for maintenance purposes.

Furthermore, PCC would obtain nonexclusive rights to all existing and future software developments for these systems.

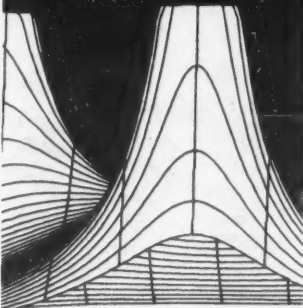
Although neither company would comment on the agreement or specify which particular assets of Philips are involved, a definitive agreement is expected by mid-December.

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DECwriter III, RO	1,995	190	102	70
DECprinter I	1,795	172	92	63
VT100 CRT DECscope	1,595	153	81	56
TI 745 Portable	1,875	175	94	65
TI 765 Bubble Mem.	2,995	285	152	99
TI 810 RO Printer	1,895	181	97	66
TI 820 KSR Terminal	2,395	229	122	84
QUME, Ltr. Qual. KSR	3,195	306	163	112
QUME, Ltr. Qual. RO	2,795	268	143	98
ADM 3A CRT	875	84	45	30
HAZELTINE 1400 CRT	845	81	43	30
HAZELTINE 1500 CRT	1,195	115	67	42
HAZELTINE 1520 CRT	1,595	153	81	56
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Contracts

The following contracts have been awarded to Canada Systems Group: The financial Management Branch of the Ontario Ministry of education has signed a 12-month agreement valued at approximately \$10,000. The Regional Municipality of Ottawa-Carleton has signed a one-year contract that will cover about \$10,000 worth of processing; and Douglas Aircraft Co. of Canada Ltd. has signed a 12-month agreement for approximately \$10,000 using Canada Systems' Computer Output Microfilm services.

Anacomp, Inc. has signed a contract with the National Bank of Kuwait to modify and install its Customer Integrated

Reference File for the bank and its 35 branches.

Integrated Software Systems Corp. has been awarded a contract from the National Research Council, Ottawa, Ontario, Canada. Under the terms of the contract, the council has licensed Integrated Software's Disspla computer graphics software system.

Tally Corp. has an OEM agreement with Four-Phase Systems, Inc. for the purchase of its Tally printers over a three-year period.

Pertec Computer Corp. has been awarded a \$1.3 million two-year contract by General Computer Systems for tape and disk drives.

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CDC Fifth DP Firm With Moscow Office

WASHINGTON, D.C. — Control Data Corp. recently became the fifth computer company to officially establish an office in Moscow. The primary purpose for opening a Moscow office is to "sell equipment and acquire Soviet technology," according to a CDC spokesman based here.

CDC received the required accreditation from the USSR State Committee for Science and Technology on Oct. 31. The accreditation process took about two years. CDC is the 24th U.S. company to be granted accreditation.

The Soviet operation is headed by James Totman, a former official at the U.S. Embassy in Moscow.

Recursive processing is one Soviet technology CDC is exploring in great

detail, according to Robert Schmidt, executive vice-president of CDC.

These systems are used primarily for process control; they consist of a series of computers hooked together in a random fashion. This allows any portion of the equipment to work on a program without particular ordering sequence, he explained.

An official statement released by the Soviet Embassy here noted that the foundation was laid for cooperation between CDC and the USSR five years ago. At that time, CDC and the USSR Committee for Science and Technology signed a long-term agreement which included setting up a joint coordinating group to study specific computer designs.

Prof. Vladimir Myasnikov, a member

of the USSR Committee for Science and Technology, said U.S. companies are interested in the vast potential of the Soviet marketplace as well as Soviet technology.

CDC purchases equipment from the USSR. According to Myasnikov, "the company purchased a computer sys-

tem based on the GDR-made EC-10-40 with Soviet peripherals and is now negotiating the purchase of applied program packages."

IBM, Hewlett-Packard Co., Honeywell, Inc. and Sperry Rand Corp. are the other computer companies with offices in Moscow.

CDC Gets Approval to Sell Technotec Service to USSR

(Continued from Page 73)

Schmidt explained.

The data base does not contain the technology itself, but rather lists brief abstracts of what the technology can

do, Schmidt said, so interested persons can contact the seller to complete a final transaction.

"By making our Technotec data base more readily available to the Soviets, we expect to contribute to a favorable balance of trade through the sale of commercial technology," he said.

In return, CDC hopes to gain more Soviet technology briefs to "offer U.S. industry the opportunity to evaluate new and improved processes in many areas." Technotec already contains some 200 Soviet entries, he noted.

Calling the service "a huge international set of yellow pages," Bill Moody, recently named Technotec president, said CDC maintains the technology abstract listing on its worldwide Cybernet data service.

CDC started Technotec about three years ago. While each partner in any technology exchange is free to pursue the market in its own way, the industry first expressed some concern over competitive disadvantages that could result from duplicating products.

Asked how receptive industry has been to the service in light of this concern, Moody pointed out that the Technotec data base has grown to include more than 18,000 entries and called the market potential "tremendous."

"Technology transfer is actively pursued in almost every type of organization through R&D groups, corporate development functions and patent license departments," he said.

Free Listings

To spur technology exchanges in the "critical" areas of solar energy, agriculture and food processing, CDC plans to offer 1,000 free one-year listings to individual inventors who hold patents in these areas. Through this offer, the firm hopes to add about 700 U.S. and 300 international patents to the Technotec Inventor's Registry.

Because searchers who find useful technologies in the Technotec data base usually contact the owner directly, CDC finds it difficult to track specific companies which, through its service, have made exchanges.

"While we know matches have occurred between a potential buyer and seller," Moody added, "the business relationships that may result are and should be private."

He did, however, cite two general examples of technology exchanges made via Technotec. One involved a U.S. mechanical refrigeration firm that supplied a special immersion freezing technique to a Venezuelan fishing fleet company.

Another deal is in the works between Soviet and West German firms for information on integrated circuit manufacturing techniques.

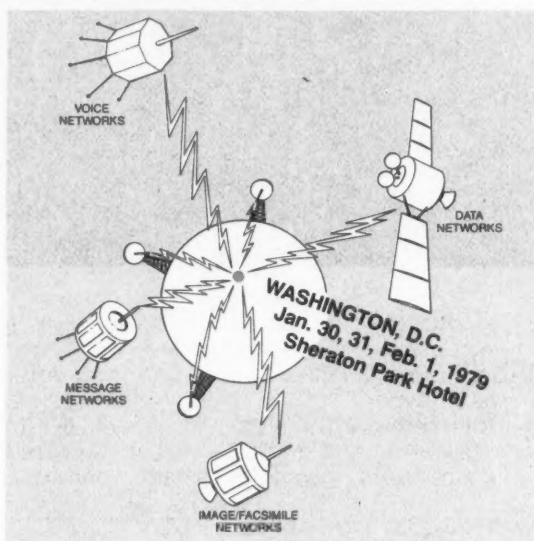
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Lessor Asks: Will Terminal Leasing Firms Last?

BOSTON — "Terminal leasing businesses are springing up almost overnight in every part of the country. The question, though, is whether these companies will be in business two years from now."

Sonny Monosson, president of American Used Computer Corp., asked that question in a recent interview and also noted that terminal leasing is growing even faster than computer terminal sales, which are expected to double by 1982.

Terminal lessors are today experiencing pressure from two fronts, according to Monosson. On one side,

users are clamoring for short-term leases — ideally 90-day leases. On the other side, however, commercial lending institutions are reluctant to lend money to lessors for purchases of terminals unless they obtain one-year leases from their customers.

"With money so tight right now, there is a problem, and probably not many firms will be able to offer short-term leases," Monosson reasoned. Consequently, customers will be putting pressure on manufacturers to offer short-term leasing programs.

A major force behind the de-

mand for terminals has been the rapid development of distributed processing and telecommunications systems within the last five years, he said.

Competition Among Vendors

Terminals are being announced at the rate of almost one per week by both major manufacturers and relative unknowns, Monosson noted. These manufacturers, however, favor large-volume sales to OEMs and distributors to avoid the financial headaches of customer support.

This competition among vendors has flooded the marketplace with "special-purpose" terminals which are technological masterpieces but often exceed user requirements and are very costly. Misinformation about terminals and a preference for leasing has resulted when vendors try to unload these terminals on a large scale, he said.

Leases give a user the chance to evaluate terminals on location and to determine the company's actual needs without having to make a commitment. Users are also reluctant to buy because they wish to avoid tying up cash flow on capital assets and are not able to define specific time and need requirements.

Flexibility is what the customer needs and wants, Monosson stressed. "Everyone has the same hardware and can offer rock-bottom rates. The thing that's going to separate the survivors from the nonsurvivors is the ability to offer lease flexibility and customer support."

The problem for many of the smaller lessors and newcomers is that they are not in the position to offer flexible terms. Commercial lending institutions, with a typically cautious approach, are dictating the policies by which these businesses lease hardware, Monosson pointed out. Limiting lease periods to a minimum of one year, requiring user commitment to lease purchase plans and setting extensive roll-over penalties were some of the policies Monosson cited.

These policies considerably jeopardize marketing capabilities. What is worse, Monosson emphasized, is that when all local or regional competition is bound to these restrictions, the user is placed in the unfavorable position of having to accept lease terms that are contrary to his needs.

Regional distributors have usually held the edge within their own territories because customers prefer to avoid high shipping costs on top of installation fees. But when high shipping costs are weighed against inflexible lease structuring by local competition,

concerns about shipping costs disappear, he pointed out.

"Companies capable of offering short-term leases, monthly roll-over periods and purchase options will become increasingly effective in penetrating regional and local markets," Monosson predicted. "American Terminal Leasing Co., for instance, has been highly successful in nationwide leasing of Decwriter IIs and IIIs because of its month-to-month leases."

"Customer support is the other key area where businesses must outperform their competition," Monosson maintained. "This is basically a function of experience. When you've been in business for a long time, you've had the chance to make a lot of mistakes."

Steps for Success

Having the hardware on hand is the first step. "Smaller businesses and newcomers may initially have the terminals," Monosson noted, "but what happens when they've just leased their whole inventory for a year and they get a call for five CRTs tomorrow?" A positive aspect of the short-term lease is the constant inventory turnaround and availability.

Equally important is the physical space to stock inventory.

Providing quick delivery and pickup is the second step. "A terminal lessor must develop a fine-tuned rapport with the trucking industry," Monosson said.

Making sure the terminal is properly installed and running is the final step. Constant telephone contact with the field

service organization — usually provided by the manufacturer — is necessary. "A thorough knowledge of terminals and hands-on experience is absolutely necessary for the terminal lessor," Monosson noted.

Survival Pressure

It is important to treat the customer with courtesy. "There's a lot more to it than just signing the contract. When it comes to customer support your first impression is a lasting one... you'd better make sure it's a good one," Monosson emphasized.

The pressure to survive is already being felt in the terminal leasing industry. According to Monosson, those with inadequate remarketing ability and limited capital will probably go the way of the IBM 360 lessors; very few of the original leasing firms have survived.

In time, all survivors in the terminal leasing industry will offer basically the same terminals, rates and lease flexibility, he believes. Then banks will be more likely to loosen the harness on lease policy with the surviving lessors, so that the only difference between them will be in customer service.

Monosson left potential terminal users to ponder two possible threats to the industry: "There are two major questions that may confuse the entire market. Will the Japanese invade the market, as they have the television market, and more important, will every telephone eventually become a terminal? These two real threats to a stable market should encourage the short-term lease."

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Judge Allows CFI Lawsuit Against Decimus

(Continued from Page 73)

mus employees in New York and San Francisco had received bribes and kickbacks.

CFI immediately countered, the suit explained, stating that the allegations of bribery were false. In October 1977, under oath, in written affidavits drafted by Decimus, CFI agreed to supply certain information to Decimus; Decimus, in turn, agreed to resume the contractual payments to CFI. However, Decimus reneged on its agreement to resume the payments, the suit alleged.

In its suit, CFI claimed it "has been damaged by Decimus' continued public and disparaging assertions of the false claim that improper payments may have been made by CFI."

CFI contended that Margoese intended to compel CFI to accept drastically reduced payments. Furthermore, it also accused Margoese of expressing the view that banks (meaning Decimus, a subsidiary of Bank of America) should make a lot of money and that CFI should not make so much money. This viewpoint, CFI said, was one of the factors causing Margoese to start the bribery investigation against CFI.

Dismissal Asked

Rather than respond to any of the charges, Decimus filed a motion in June to dismiss several of CFI's charges. A motion to dismiss the charges against Margoese and Mickel was made on the grounds that the court lacked personal jurisdiction over

those defendants in their individual capacities, particularly since they did not reside in New York during the time the alleged activities took place, but rather traveled to New York infrequently and for short durations.

The defendants asked the court to dismiss other complaints on the grounds that in New York a breach of contract does not constitute an actionable tort and that punitive and exemplary damages are not recoverable on a claim for breach of contract.

The ruling made by Judge Richard Owen, however, indicated that those claims made by CFI against Decimus can indeed be heard in New York courts.

Law to Spur Risk Capital

(Continued from Page 73)

more than \$30,000 in assets to pay for one additional job in a high-technology firm, and \$14,000 of that capital must be obtained through risk capital.

Although the value of stocks of high-

technology companies can quadruple in three or four years, the high risk involved with those investments compounded with a maximum capital gains tax rate of 49% caused many investors to avoid those stocks, Kenneth Hagerty, vice-president of government operations for the AEA, pointed out.

Pressure from the AEA task force and grass roots support from executives in AEA's 1,200 member firms, along with backing from Rep. William A. Steiger (R-Wis.) and Sen. Clifford P. Hanson (R-Wyo.), were the forces that overcame President Carter's threat to veto any tax bill containing provisions for cuts in the maximum capital gains tax, according to AEA officials.

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Country	Installed Value of General Purpose Computer Systems	% of total world value	World Rank as DP Market
United States	36,100	45.3%	1
Japan	8,331	10.0	2
W. Germany	6,527	7.9	3
United Kingdom	4,794	5.8	4
France	4,768	5.8	5
Canada	2,301	2.8	7
Italy	2,119	2.6	8
Australasia	2,044	2.5	9
Brazil	532	.8	17
Middle East	328	.4	22



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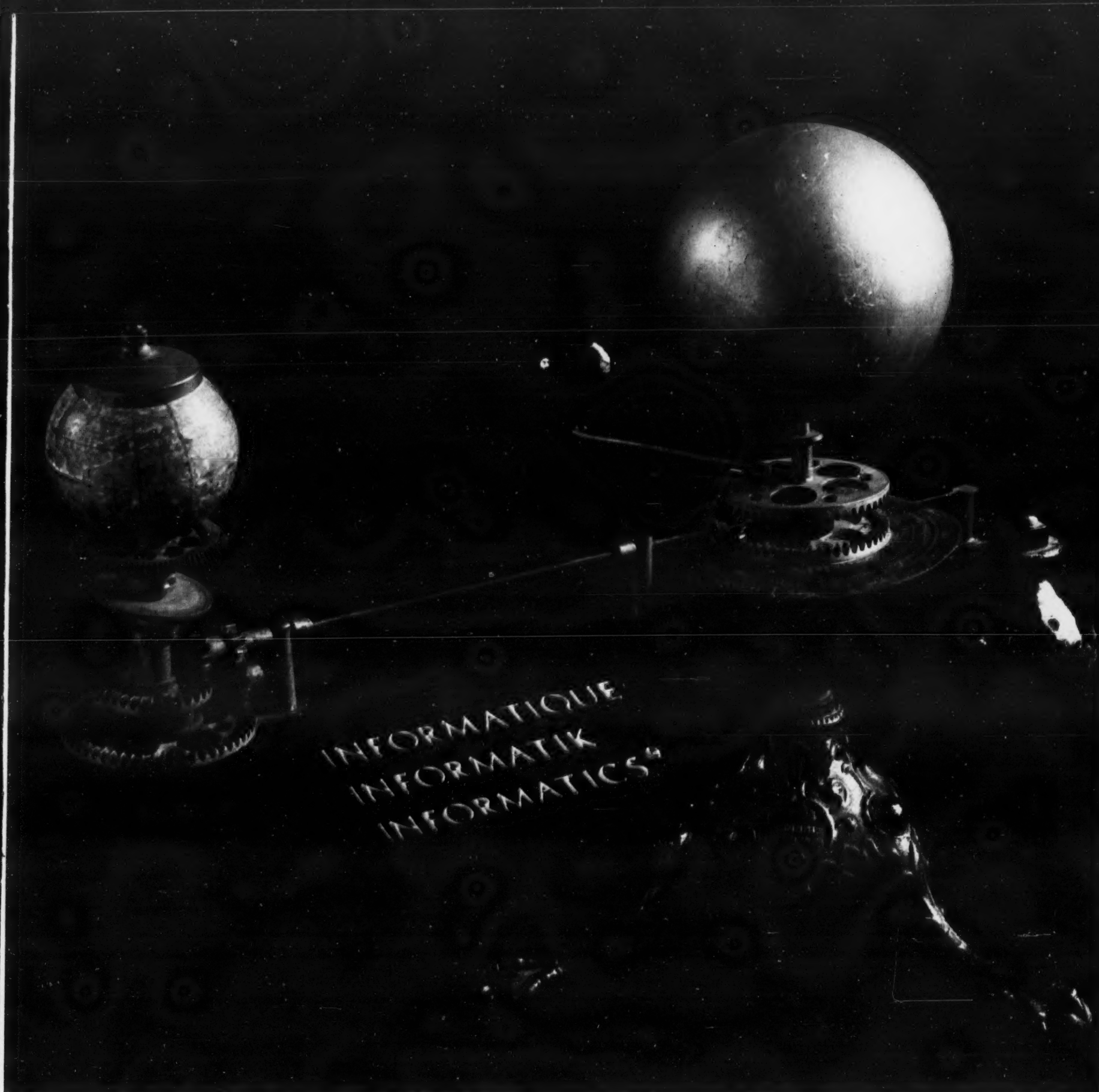
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Executive Corner

- Harry J. Morley has been elected president of ITT Communications Systems, a division of International Telephone & Telegraph Corp.
- J. Robert Harcharik has been named president of Tymnet, Inc.
- Sherman A. Drusin has been named president of Program Products, Inc. Paul R. Kalback has been promoted to senior vice-president and Emanuel A. Cambra has been promoted to vice-president at the firm.
- Peter S. Jonas has been elected vice-president of finance, treasurer and chief financial officer of General Automation, Inc.
- Charles A. Dickinson has been appointed senior vice-president of operations at Data Products Corp.
- James Graves has been appointed to the position of vice-president of operations at Micom Systems, Inc.
- Paul R. Lachance has been appointed national sales manager for Data I/O Corp.
- Joseph C. Antonaccio has been named director of communications for Analogic Corp., and Ronald F. Morales has been appointed purchasing manager at the firm.
- J.W.E. Hollely has been named product marketing manager for the System Ten product line at ICL, Inc.
- C. Jean Littrell has been promoted to corporate marketing services manager at Stanford Applied Engineering, Inc.
- Charles Cech has been appointed vice-president of sales at Pro-Log Corp.
- Ben Irwin has been promoted to manager of programs at Monolithic Memories, Inc.
- John DeLuca has been appointed director of operations control for the Wyle Distribution Group.




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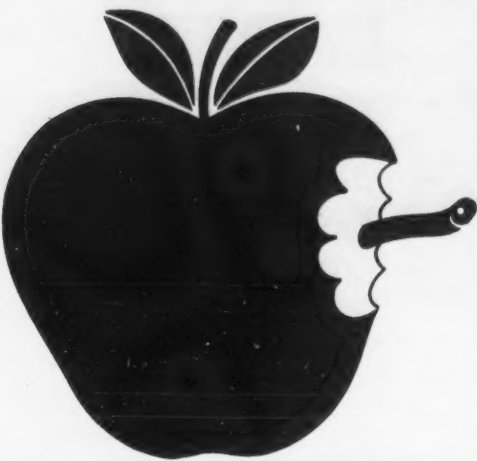
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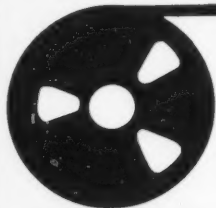
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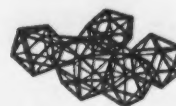
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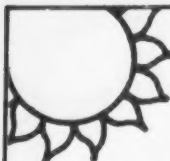
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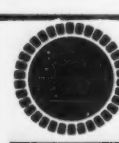
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Mr. Robert Coyner
Manager Professional Staffing
Harris Computer Systems Division
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HARRIS
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SOFTWARE ANALYSTS

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RCA

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* OPERATIONS ANALYST

5 years experience in IBM 370 series with thorough knowledge of OS JCL and VSI. Some programming knowledge required.

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2-5 years experience in operations (hardware), i.e., controllers, terminals, telecommunications equipment and RJE, with programming knowledge.

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2-3 years experience with timesharing, CMS or TSO preferred. Experience with user support and user education desirable.

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IBM _____	NO. OF YRS. _____	MOST RECENT YR. _____	360 _____ 370 _____
WANG MINI-COMPUTERS (CPU) _____			
ADDITIONAL HARDWARE _____			
LANGUAGE EXPERIENCE:			
COBOL _____	CMS _____	ASSEMBLER _____	
MARK IV _____	CICS _____	FORTRAN _____	
DL/I DATA BASE (IMS) _____			
OPERATING SYSTEMS:			
JCL _____	OS types _____	VM/CMS _____	CICS _____
VSI _____	MVS _____	OS _____	CICS _____
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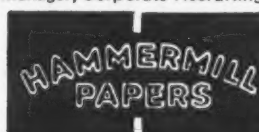
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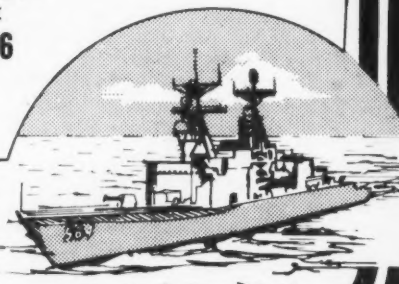
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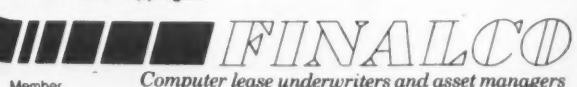
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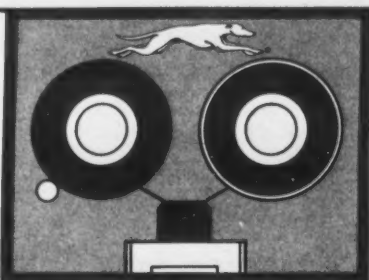
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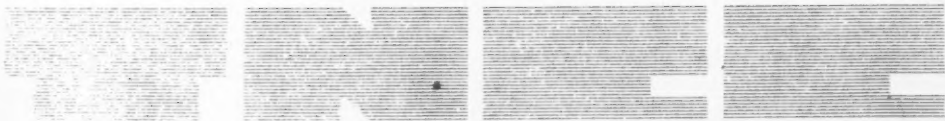
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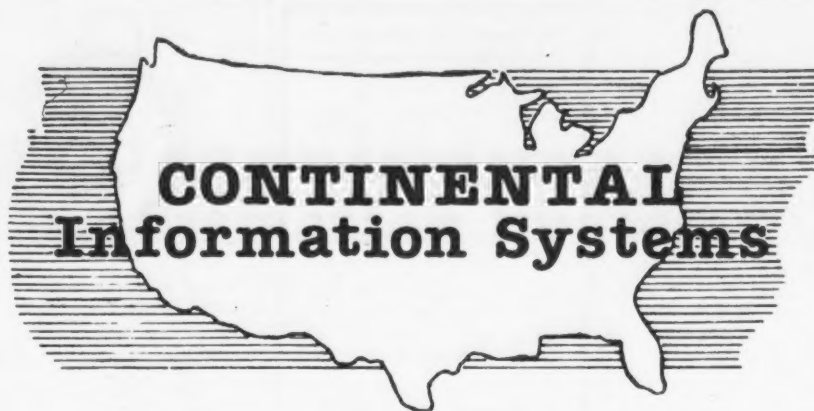
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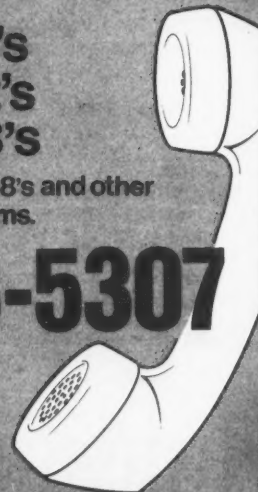
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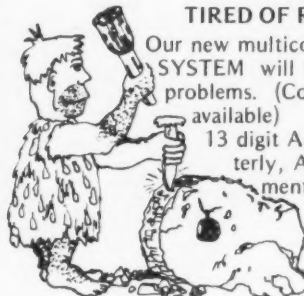
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Year Ended Sept. 30

	1978	1977
Shr Ernd	\$1.02
Revenue	86,320,000	\$66,781,000
Tax Cred	1,075,000
Earnings	4,425,000	(3,580,000)
3 Mo Shr	.42
Revenue	24,018,000	18,411,000
Tax Cred	487,000
Earnings	1,879,000	(1,000)

COMPUTERIZED AUTO REP

Three Months Ended Sept. 30

	1978	1977
Shr Ernd	\$.16	\$.18
Revenue	3,578,000	\$3,102,000
Earnings	252,000	281,000
9 Mo Shr	.48	.56
Revenue	10,389,000	\$9,107,000
Earnings	760,000	900,000

a-Restated.

DATA CARD

Three Months Ended Sept. 30

	1978	1977
Shr Ernd	\$.38	\$.22
Revenue	11,136,000	7,876,000
Earnings	1,018,000	568,000
6 Mo Shr	.62	.32
Revenue	21,039,000	14,182,000
Earnings	1,646,000	829,000

INFOREX

Three Months Ended Sept. 30

	1978	1977
Shr Ernd	\$.30	\$.18
Revenue	17,599,000	16,373,000
Tax Cred	131,000	115,000
Earnings	994,000	534,000
9 Mo Shr	.67	.36
Revenue	50,728,000	45,955,000
Tax Cred	284,000	201,000
Earnings	2,140,000	1,075,000

a-Restated to reflect accounting change for leases.

WANG LABS

Three Months Ended Sept. 30

	1978	1977
Shr Ernd	\$.30	\$.18
Revenue	55,774,000	36,221,000
Earnings	3,537,000	1,869,000

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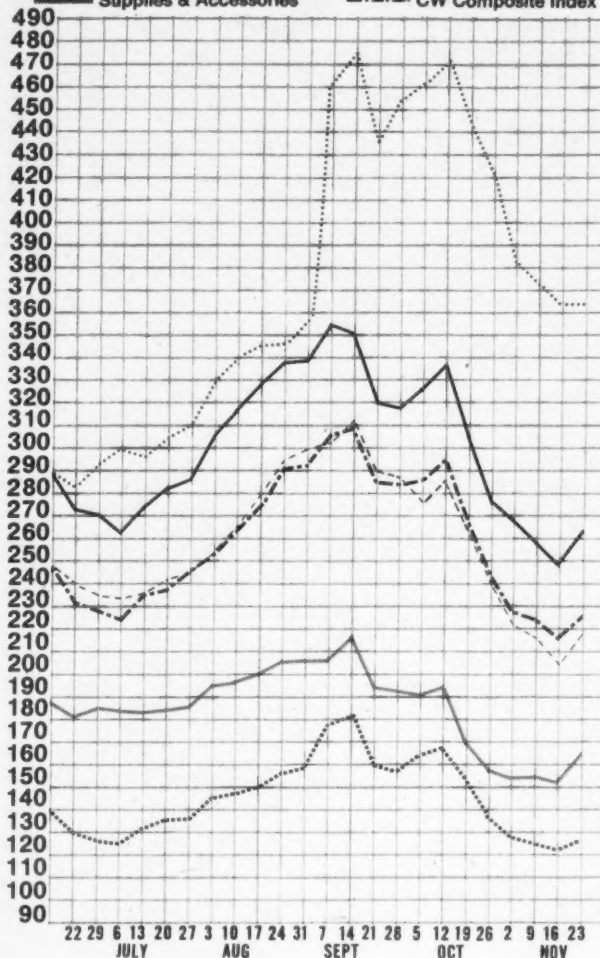
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Computerworld Stock Trading Summary

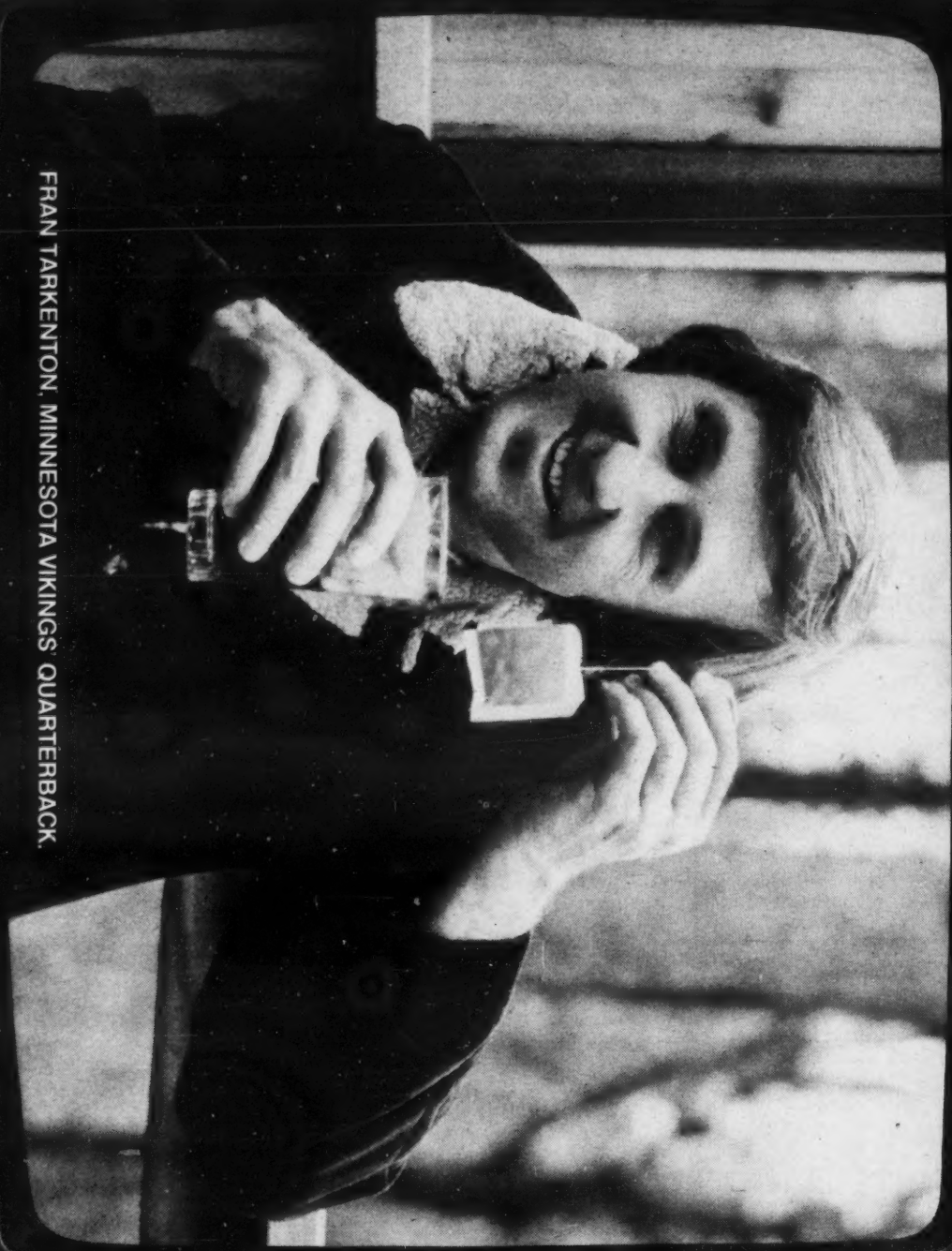
CLOSING PRICES WEDNESDAY, NOVEMBER 21, 1978

All statistics compiled,
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E X C H	PRICE					E X C H	PRICE					E X C H	PRICE								
	1978 RANGE (1)	CLOSE NOV 21 1978	WEEK NET CHNGE	WEEK PCT CHNGE	1978 RANGE (1)		CLOSE NOV 21 1978	WEEK NET CHNGE	WEEK PCT CHNGE	1978 RANGE (1)	CLOSE NOV 21 1978		WEEK NET CHNGE	WEEK PCT CHNGE							
COMPUTER SYSTEMS																					
A	AMDAHL CORP	28-69	46 3/8	+3 3/4	+8.7	O	ADVANCED COMP TECH	1-2	1	0	0.0	O	DATA ACCESS SYSTEMS	3-14	12 1/4	-1/2	-3.9				
N	BURROUGHS CORP	59-87	70 7/8	+7/8	+1.2	O	ANACOMP INC	8-22	11 1/2	+3/4	+6.9	O	DATA 100	9-20	19 5/8	+1/4	+1.2				
O	COMPUTER AUTOMATION	15-44	17 1/2	+1/2	+2.9	A	APPLIED DATA RES.	8-17	9 3/4	+3/4	+8.3	A	DATA PRODUCTS CORP	14-25	16	+1 3/4	+12.2				
N	CONTROL DATA CORP	23-44	31 7/8	+2 3/8	+8.0	N	AUTOMATIC DATA PROC	24-36	30	0	0.0	O	DATUM INC	2-6	2 1/2	-1/8	-4.7				
O	GRAY RESEARCH INC	21-74	27	+3 1/2	+14.6	O	COLEMAN AMERICAN COS	1-2	7/8	-1/8	-12.5	O	DECISION DATA COMPUT	2-6	3 1/8	+3/8	+13.6				
N	DATA GENERAL CORP	42-71	58 1/8	+3	+5.4	O	COMPU-SERV NETWORK	6-12	6 1/4	0	0.0	O	DELTA DATA SYSTEMS	1-1	3/4	-7/8	-53.8				
N	DATAPoint CORP	34-75	58	+5	+9.4	O	COMPUTER HORIZONS	1-9	5 3/4	+1/4	+4.5	A	DOCCUMATION INC	6-34	19 7/8	+2 1/4	+12.7				
N	DIGITAL EQUIPMENT	39-54	47 3/4	+1 1/8	+2.4	O	COMPUTER NETWORK	6-16	6 3/4	+1/4	+3.8	O	DATARAM CORP	6-32	20	0	0.0				
N	ELECTRONIC ASSOC.	2-13	7 1/8	+5/8	+9.6	N	COMPUTER SCIENCES	8-17	11 1/8	+1 1/2	+15.5	N	ELECTRONIC M & M	4-9	4 3/4	+1/2	+11.7				
A	ELECTRONIC ENGINEER.	9-19	11 1/2	+1 1/8	+10.8	O	COMPUTER TASK GROUP	1-4	4 1/2	+3/4	+20.0	O	FABRI-TEK	1-2	1 1/8	-	-5.3				
N	FOUR-PHASE SYSTEMS	19-46	26 1/8	+1 1/8	+4.5	O	COMPUTER USAGE	2-4	2 1/4	+1/8	+5.8	O	GENERAL COMPUTER SYS	1-3	1 5/8	+1/4	+18.1				
N	FOXBORO	28-40	32 1/2	+1 1/2	+4.8	O	COMPUT AUTO REP SVC	4-10	5 7/8	+1/4	+4.4	O	GENERAL DATACOMM INC	9-21	10 1/2	0	0.0				
O	GENERAL AUTOMATION	7-26	13 3/4	+1 1/4	+10.0	O	COMSHARE	6-19	13 1/4	+3/4	+6.0	N	HAZELTINE CORP	10-17	11 1/4	+7/8	+8.4				
O	GRI COMPUTER CORP	1-3	1	0	0.0	O	CULLINANE CORP	14-33	17	+2 1/4	+15.2	N	HARRIS CORP	17-36	29 5/8	+3/8	+1.2				
N	HEWLETT-PACKARD CO	62-93	81 3/4	+2 7/8	+3.6	O	DATA DIMENSIONS INC	4-9	4 5/8	+3/8	+8.8	O	INFOREX INC	6-11	6 3/8	-1/8	-1.9				
N	HONEYWELL INC	43-72	63 3/4	+2 3/4	+4.5	O	DATATAB	1-2	1	0	0.0	O	INFORMATION INTL INC	7-12	7	-1/4	-3.4				
N	IBM	236-305	264	+5 1/2	+2.1	N	ELECTRONIC DATA SYS.	15-25	17 7/8	-1/8	-0.6	O	INFOTON	1-3	2 1/4	0	0.0				
O	MANAGEMENT ASSIST	9-29	16 1/2	+1 1/8	+7.3	O	INSYTE CORP	1-3	1	0	0.0	O	INTEL CORP	39-62	49	+3	+6.5				
O	MANUFACTURING DATA S	9-23	18 3/4	+1 3/4	+10.2	O	IPS COMPUTER MARKET.	2-3	3 1/4	0	0.0	A	LUNDY ELECTRONICS	4-8	4 3/8	-1/4	-5.4				
O	MICRODATA CORP	10-23	18 1/4	+2 3/4	+17.7	O	KEANE ASSOCIATES	3-6	4 1/2	+1/4	+5.8										
O	MINI-COMPUTER SYST	4-8	4 3/4	+1/2	+11.7	O	KEYDATA CORP	1-3	2	+1/4	+14.2	O	MSI DATA CORP	10-19	11 3/4	+3/8	+3.2				
O	MODULAR COMPUTER SYS	7-17	8 1/2	+1	+13.3	A	LOGICON	10-19	11	+3/4	+7.3	N	MEMOREX	27-59	30 7/8	+3	+10.7				
N	NCP	37-67	58 1/8	+1	+1.7	A	NATIONAL CSS INC	15-36	24 1/8	+1 1/4	+5.4	N	MOHAWK DATA SCI	6-15	8 5/8	+1 1/4	+16.9				
N	PRIME COMPUTER INC	20-43	26 7/8	+7/8	+3.3	O	NATIONAL DATA CORP	7-13	8 1/4	+1/4	+3.1	O	OME X	2-4	5 1/2	0	0.0				
N	PERKIN-ELMER	17-28	25	+1 1/8	+4.7	A	ON LINE SYSTEMS INC	12-30	15 3/4	+2	+14.5	O	PARADYNE CORP	9-17	9	+1/8	+1.4				
N	SPERRY RAND	33-49	41 1/2	+3/4	+1.8	N	PLANNING RESEARCH	4-10	6 1/2	+3/4	+13.0	O	PENRIL CORP	5-12	9 1/4	+1/8	+1.3				
A	SYSTEMS ENG. LABS	11-24	12 7/8	+3/8	+3.0	O	PROGRAMMING & SYS	1-1	1 1/4	0	0.0	N	PERTEC CORP	9-17	10 3/4	0	0.0				
O	TANDEM COMPUTERS INC	13-37	26 1/2	+1 3/4	+7.0	O	RAPIDATA INC	3-7	4 1/8	+1/8	+3.1	A	POTTER INSTRUMENT	2-2	1 3/4	0	0.0				
A	WANG LABS.	12-32	23 1/4	+3 1/4	+16.2	O	REYNOLDS & REYNOLD	18-36	29	+2 1/2	+9.4	O	QUANTOR CORP	2-5	2 5/8	0	0.0				
LEASING COMPANIES																					
O	BOOTH COURIER CORP	13-21	17 1/4	0	0.0	O	SCIENTIFIC COMPUTERS	3-9	5 3/4	+1/4	+4.5	O	RECOGNITION EQUIP	7-13	8	+1/8	+1.5				
C	COMDISCO INC	5-22	14 1/4	+1 1/2	+11.7	O	TYMSHARE INC	18-33	25 1/4	+2 1/4	+9.7	O	SCAN DATA	1-5	1 7/8	-1/8	-6.2				
A	COMMERCE GROUP CORP	1-1	1/4	-1/8	-33.3	A	URS SYSTEMS	5-8	5 1/8	+1/4	+4.2	N	STORAGE TECHNOLOGY	19-46	26 3/8	+2 3/4	+11.6				
A	COMPUTER INVSTRS GRP	1-7	2 3/4	-3/4	-21.4	N	WYLY CORP	1-7	3 7/8	+1/8	+3.3	O	T BAR INC	11-20	14 1/4	+3/4	+5.5				
O	CONTINENTAL INFJ SYS	5-15	6 1/2	+1/4	+4.0	PERIPHERALS & SUBSYSTEMS										O	TALLY CORP.	4-9	8	+1 1/4	+18.5
N	DATRONIC RENTAL	1-3	2 1/8	-1/4	-10.5	N	ADDRESSOGRAPH-MULT	14-32	22 3/4	+2 1/2	+12.3	A	TEC INC	6-13	6 3/4	+1/4	+3.8				
A	DCL INC	3-5	3 1/2	+3/8	+12.0	O	ADVANCED MEMORY SYS	7-18	12 1/8	+1 1/2	+14.1	N	TEKTRONIX INC	33-50	44 3/4	+2 3/4	+6.5				
N	DPF INC	8-14	9 7/8	+3/4	+8.2	N	AMPEX CORP	10-19	14 1/2	+1 1/2	+11.5	N	TELEX	3-9	5 1/4	+1/2	+10.5				
N	ITFL	16-36	24 1/4	+2 7/8	+13.4	O	ANDERSON JACOBSON	5-10	5 5/8	+3/8	+7.1	O	TESDATA SYSTEMS CP	9-23	9 1/4	-1/2	-5.1				
N	LEASCO CORP	24-36	32 3/4	+7/8	+2.7	N	APPLIED DIG DATA SYS	9-22	9 1/4	+1/4	+2.7	O	WILTEK INC	1-2	7/8	-1/4	-22.2				
O	LEASPCORP	1-4	3	+1/2	+20.0	O	BEEHIVE INT'L	3-7	3 5/8	+7/8	+31.8	SUPPLIES & ACCESSORIES									
A	PIONEER TEX CORP	3-7	3	-3/8	-11.1	A	BOLT, BERANEK & NEW	6-14	9 5/8	+3/8	+4.0	A	AMERICAN BUS PRODS	6-11	7 5/8	-3/8	-4.6				
N	U.S. LEASING	13-20	14 1/4	+3/8	+2.7	N	BUNKER-RAMO	10-20	14 7/8	+2 3/4	+22.6	O	BALTIMORE BUS FORMS	2-4	1 1/2	+1/2	+50.0				
																A	BARRY WRIGHT	14-30	23 5/8	+3 5/8	+18.1
																A	CALCOMP	1-1	5/8	0	0.0
																O	CAMBRIDGE MEMORIES	13-30	17	+1 1/2	+9.6
																N	CENTRONICS DATA COMP	8-17	10 5/8	-1/4	-2.2
																C	COGNITRONICS	43-66	60 3/8	+2 3/8	+4.0
																O	COMPUTER COMMUN.	26-34	28 3/4	+1/4	+0.8
																O	COMPUTER CONSOLES	18-37	23 1/8	+3/4	+3.3
																A	COMPUTER EQUIPMENT	20-27	22 3/4	+1 1/4	+5.8
																O	COMPUTER TRANSCIVER	8-16	9 3/4	+1/4	+2.6
																O	COMPUTERVISION CORP	19-47	46 3/4	+0 1/8	+21.0
																O	CONTECH	10-22	14 3/4	+1 1/4	+9.2
																N	CONRAC CORP	18-33	22 3/4	+1	+4.5

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